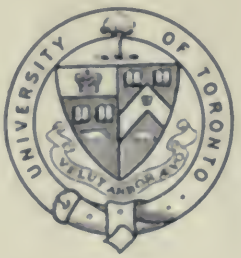

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

CONTENTS.

	Page
A BRIEF HISTORY OF THE NON-SALE OF GAME IN CALIFORNIA.....Harold C. Bryant	1
GAME NOTES ON THE NON-SALE OF GAME.....Ernest Schaeffle	2
EFFORTS TO CONSERVE THE GAME AND CONTROL THE VIOLATOR.....F. M. Newbert	3
RESPONSIBILITY FOR THE PRESERVATION OF THE GAME AND FISH.....Frank M. Rutherford	4
FISH AND GAME CONSERVATION DEPENDENT ON CONSERVATION OF OTHER NATURAL RESOURCES.....Geo. C. Pardee	6
ATTEMPTS TO PROTECT THE SEA FISHERIES OF SOUTHERN CALIFORNIA.....Chas. Frederick Holder	9
WILD LIFE AS A COMMUNITY ASSET.....Joseph Grinnell	20
EDITORIAL	23
DEPARTMENT OF COMMERCIAL FISHERIES	26
CONSERVATION IN OTHER STATES	27
LIFE HISTORY NOTES	28
WILD LIFE IN RELATION TO AGRICULTURE	29
REPORTS—	
Seizures and Searches	30
Violations of the Fish and Game Laws	31
Game Bounties	32
Financial Report	34

A BRIEF HISTORY OF THE NON-SALE OF GAME IN CALIFORNIA.

By Harold C. Bryant.

The non-sale of game was first brought prominently before the people of California in 1893, in which year the sale of deer was prohibited. The slaughter of quail by market hunters led to the taking of this species from the market in 1901. A few years later the non-sale of ducks and other water fowl began to be advocated by those conversant with game conditions. A crisis was reached when, in 1913, along with many other bills relating to fish and game, there was introduced into the legislature what has since been known as the "Flint-Cary Bill," prohibiting the sale of wild ducks and wild pigeons, in addition to the wild game the sale of which had been previously forbidden.

After a hot campaign and much active work on the part of conservationists the bill was passed by both houses and in due time was signed by the governor. The victory was largely due to the active work of the State Fish and Game Commission, and the California Associated Societies for the Conservation of Wild Life, the latter organization consisting of a number of prominent scientific societies of the state having been organized to further this needed conservation measure.

At the time this bill was before the legislature there was great opposition from certain special interests directly connected with the sale of game. The Northern California Hotel Men's Association lobbied con-

unually, and market hunters and game dealers helped with campaign expenses. Failing to prevent the passage of the bill, these same interests got up a referendum petition, circulated it almost entirely in San Francisco and Oakland, and filed it with the requisite number of signatures. Consequently the non-sale of game bill was set aside and will appear on the ballot at the general election, November 3, 1914, as proposition No. 18. Soon after the filing of this referendum petition it developed that gross frauds had been committed in the securing of signatures. Mr. Theodore Kytka, the famous handwriting expert of San Francisco, examined the petition at the direction of the San Francisco grand jury and obtained evidence of thousands of forgeries. As this article goes to print the attorney general of the state, at the direction of the governor, is investigating the alleged frauds committed in connection with the circulation of the petition.

The circulation of an initiative petition by the "People's Fish and Game Protective Association," an organization made up almost entirely of market hunters, game dealers, and persons connected with the Northern California Hotel Men's Association, having for its purpose the amending of practically all of the present game laws and the placing on sale of all game, greatly endangered the cause of conservation and complicated the problem before the public. Fortunately, the backers of the initiative petition succeeded in obtaining much less than the 32,000 signatures required by law, even after a most strenuous statewide campaign. Consequently this troublesome proposition will not appear on the ballot.

Conservationists throughout the state were not daunted by these attacks on necessary and just laws, and united in a campaign to have the legislature and the governor sustained through the approval of the non-sale bill at the November election. A work of publicity and education has been and is being conducted in every part of the state, and it is hoped that the public will have by election time a correct idea as to the causes that menace the game supply.

In order to sustain the legislature and the governor and to secure the measure most needed for the conservation of the state's wild life, vote YES on proposition No. 18. A vote of YES will also be a rebuke to the interests and the fraudulent methods responsible for setting aside a wise law and causing the people of the state the expense and trouble of a referendum vote.

SOME NOTES ON THE NON-SALE OF GAME.

By Ernest Schaeffle, Executive Secretary, Fish and Game Commission.

The wild game belongs to the people in their sovereign capacity and as such should be enjoyed by the people and cared for and preserved for their benefit. It must not be considered as the property of a class and no class should be permitted to monopolize it.

It is generally agreed that wild game is attractive to a great many persons and that it has such value that the state should care for it wisely, as the state cares for land, water, forests, and other assets of a public nature.

Said Theodore Roosevelt: "It is not merely folly, it is wickedness, to permit a small number of our people, perhaps two or three per cent, to destroy the animals and birds in which the other ninety-seven per cent have an equal ownership, and in which property of all should have an equal protection."

Obviously, game should be preserved in order that the people may enjoy and profit. This brings us to the matter of best and most profitable use—use for all the people are concerned.

Dr. T. S. Palmer of the U. S. Biological Survey, one of the foremost game authorities in the world, states: "I am satisfied that the time has come when the market should be closed to the trade in game if the state is to conserve its present supply."

The state ornithologist of Massachusetts declares the prohibition of sale to be a very effective means of checking the slaughter of game.

From 50 to 95 per cent of the state's game has been killed off within one generation. Unless killing is restrained, all desirable varieties will be practically extinct within twenty-five years. It is a fixed principle that every wild species of mammal, bird or reptile that is pursued for money making purposes eventually is wiped out of existence. Even the whales of the sea are no exception. The value of game as food is now infinitesimal, compared with its value in stimulating outdoor life. A round $15,000,000.00 is spent in California each year on hunting and fishing; which expenditure depends entirely on the presence of something to hunt and fish.

So long as the sale of game is permitted, lawbreaking will be common; the price is a bounty, encouraging the killing of more than the limit and even the killing during closed season, when illicit profits are greatest.

The right of any generation to careless indifference or wanton destruction can not be admitted. Each generation is the guardian of the existing resources of the world; it comes into a great inheritance, but only as a trustee, and there is no recovery or resurrection of an extinct species.

EFFORTS TO CONSERVE THE GAME AND CONTROL THE VIOLATOR.

By Frank M. Newhart, President State Fish and Game Commission.

The total fund collected and disbursed by the State Fish and Game Commission is obtained by the sale of hunting and fishing licenses and through fines collected for violations of the fish and game laws. The state has not, since 1909, appropriated one cent from the general fund for use in fish and game matters.

Since those who hunt and fish contribute the whole of the funds at the command of the Fish and Game Commission, it is but just and natural that the efforts of this Commission should be directed toward conserving, for the benefit of the people, the grand heritage of wild life that has come to us from our forefathers. To that end we have endeavored to perfect our patrol system until now we have as efficient a force of field deputies as may be found in any state in the union. We have utilized to the fullest extent the capacities of our fish hatch-

eries, and plant in our streams more trout fry than any other state in the union. We have taken the lead in protective measures, such as screens and fishways, until to-day California leads the world in such devices.

A high standard of specialized knowledge is essential to the proper management and discharge of the manifold duties reposing in this Commission. To that end only the very best of men have been employed in the work. Deputies must maintain a high percentage in the excellence of their work, fish culturists are the best in the world, and all other employees must hold the same high standard of efficiency.

With such an efficient force at command we are enabled, to a degree, to carry out the ironclad rule of this Commission, and that is to accomplish the greatest good for the greatest number. To conserve the fish and game, to increase the supply, to prohibit wanton destruction, and to restrict fishing and hunting to the taking of what is necessary to the individual, is the aim of this Commission.

OUR RESPONSIBILITY FOR THE PRESERVATION OF THE GAME AND FISH.

By Hon. Frank M. Rutherford.

Early settlers in California found antelope abundant in the Sacramento Valley. It was only necessary in those days, in order to "bag" an antelope, for the pioneer to go out on the plain where some of them were in sight, lie down on his back in the tall grass and kick his feet in the air, when the foolishly inquisitive creatures, attracted by the unusual sight, would begin bounding around in a circle about the strangely animated object and, as their curiosity increased, keep getting closer and closer, until coming within range, a shot from the long squirrel rifle would bring one to the ground. It was not many years until the antelope of the Sacramento Valley had entirely disappeared. Yet to-day how we would be delighted if we could just now and then catch a glimpse of one of those beautiful animals bounding over the plain.

Every other game bird and animal of our state, sooner or later, was doomed to the same inexorable fate as the antelope had they been left unprotected. While most birds and animals are not such easy prey to the hunter as the antelope, the increased demand for game, with the better facilities for taking it with improved firearms, trained dogs, and various devices, has so overcome the protecting instincts of the animals and birds that they must have inevitably been destroyed without protection.

So often we lock the door after the horse is stolen. Let it not be so with the game birds and wild creatures of California. Though some are already things of the past, yet the supply and variety of most of them are sufficient, with proper protection, to restore their former numbers and perhaps increase the quantity in many instances. The Fish and Game Commission has worked earnestly and faithfully and has accomplished much in this respect. Through its vigilance deer

ve been increasing rapidly in parts of the state, grouse have been
ved from extermination and mountain quail are holding their own
Every citizen and resident of the state should take an interest in the
otection and preservation of the game birds and animals. They are
e properly of all the people, and the state is endeavoring by legis-
tive enactments to give all an equal show in pursuing and taking
me, under such restrictions only as are proper for the preservation
the game. The efforts of the state and the efforts of the Commission
e ineffectual without the co-operation of the people.

There is no other subject, perhaps, upon which legislation has been
probific of dissatisfaction as upon regulating the taking of fish and
me, no other subject upon which prejudices apparently arise so easily
nd absent which is made so much adverse criticism—not only criticism,
t base insinuations and false accusations. Yet there has not been a
w passed in this state for the last fifteen years at least, regarding fish
nd game, that has not been passed honestly and conscientiously with
e single object in view of doing that which was the best for the fish
nd game of the state. There has never been a law passed during that
me that was intentionally designed to favor any citizens, or class of
tizens, of this state. Mistakes may have been made, but they have
en mistakes of the head and not of the heart. Such adverse criticisms
nd accusations are most always the outcroppings of ignorance, preju-
ce, and distemper. Well-meaning persons have made mistakes per-
aps, but, if they will honestly investigate, they will not be long in
scovering their errors.

Everyone should cooperate with the wardens in their work of pro-
cting and preserving the fish and game of our state. California, with
r highly diversified and wonderfully attractive physical features, her
aried and alluring climatic conditions, her flowers, her fruit and vast
sources, to which generous nature has added fish, bird, and animal
fe so varied, so distinctive and so plentiful, that it would not only
ar the symmetry of nature's gracious endowment, but brand our
ople as indifferent, careless, and unprogressive, to neglect that attrac-
ve feature of our state.

Thoughtful, intelligent, and progressive residents of the state are
ming to view the matter of the preservation of fish and game with
ore consideration each year and to enter into the spirit of it more
alously. It is gratifying to observe this welcome change in public
ntiment, and it is sincerely to be hoped that it will not be long until
e sentiment of every community of the state is in full accord with the
ws for the protection and preservation of the fish and game. No laws
n be upheld without public sentiment behind them, particularly when
moral turpitude is involved. Laws for the protection of fish and
me must be supported by public sentiment, and wherever the senti-
ent for the enforcement of laws is strong there will be few violators
the law. It will not be long until that sentiment prevails throughout
e state.

FISH AND GAME CONSERVATION DEPENDENT ON CONSERVATION OF OTHER NATURAL RESOURCES.

By Ex-Governor Geo. C. Pardee

Everybody who has given the subject much thought admits that fish and game ought to be conserved, not preserved, for the public benefit. Practically every state in the union has some sort of fish and game laws, some sort of a fish and game commission.

We commonly speak of such laws and such commissions as "fish and game preservation" laws and commissions. That, however, is a misnomer. For of what good to the public would preserved fish and game be?

Like all other natural resources, our fish and game should be conserved, that is, used, at such times and in such quantities and under such conditions as the public needs require, but without unnecessary waste or destruction.

Preserved game and fish, like preserved forests or preserved water-powers, are of no practical public good. Preserved fish and game die; so do preserved trees; preserved water-powers run to waste. Conserved—that is, used and protected—fish and game, forests, water-powers and all other natural resources are, of course, of practical benefit to the public. And, therefore, fish and game conservation—not preservation—commissions are of practical benefit to the public.

We do not permit anybody to destroy the publicly-owned forests. There is an unenforceable California law against the "cold-storaging" of water-powers. It is the duty of the Fish and Game Commission to see to it that our animated natural resources are not destroyed or wasted.

Our game, however, can not be conserved, or even preserved, if the cover in which and the food on which it lives be not conserved. Our fish can not be conserved, or even preserved, if the waters in which they live be not kept at least free from pollution. If our wild places be permitted to be fire ravaged and destroyed, if our streams and bays be made the dumping grounds for noxious materials, then there will be no use for game and fish conserving laws, no need for a fish and game conservation commission—there will be no fish and game to be conserved.

Everybody, therefore, who believes—as almost everybody does—in the conservation of fish and game, must, if he takes a second thought, believe just as thoroughly in the conservation—that is, the use without unnecessary waste or destruction or impairment of the necessary use of—our forests and our waters. The fish and game conservationist, therefore, must be a forest and water and waste places conservationist, whether they be publicly or privately owned. For it is just as much an injury to the public, including the hunter and fisherman, amateur or professional, if our forests are destroyed, no matter whether they be publicly or privately owned. For upon the continued existence of our forests, whether publicly or privately owned, depends very largely the full running of our streams, without which our fish and game can not be fully conserved. And as forests may be forever used without being destroyed, it follows, of course, that the fish and game conservationists must deprecate the destruction of privately-owned forests and must oppose the further giving away of our publicly-owned forests into private ownership, which has always ended in their destruction.

Water is a natural resource, the most necessary of them all, which belongs to the people and can not be alienated from them. It is only the right to use water that can become private property. Upon the proper employment of this right to use, when it becomes private property, depends not only the fisherman's and hunter's vocation and sport, but also the prosperity and comfort, even the necessities, of all the people. The general public, therefore, as well as the fishermen and hunters, is interested in seeing to it that our water resources are conserved, that is, used, at such times, in such quantities, under such conditions as the public necessities require, without any unnecessary waste, without monopolies that will interfere with the public good.

How shall the public see to it that its water resources are conserved? Shall this important function be given over to the Fish and Game Commission, which is a commission with a highly specialized function, viz., that of conserving fish and game? Shall it be made the duty of the already over-burdened Railroad Commission to see to it that the right to use our waters is not improperly or wastefully acquired or exercised? Somebody representing the public, must do it. To whom better than to a water commission, making a specialty of this highly important and very special matter, can the conservation of our waters be intrusted? In other words, the work of the Fish and Game Commission ought to be aided and supplemented by a water conservation commission, in addition to the already existing forestry conservation commission.

The work of a water commission is as highly specialized as is that of a fish and game commission, or a forest conservation commission, or a railroad commission. Recognizing that it is impracticable, if not impossible, to create one commission with special knowledge in all these diverse and very important matters, other states have created, as California has, a separate commission for each of them.

At the last session of our legislature, an act was passed creating a water commission, with power to see to it that the water resources of the state shall be conserved, that is, used at such times and in such quantities and under such conditions as the public necessities for power, irrigation, domestic purposes, etc., may require, but without unnecessary waste, and without monopoly detrimental to the public.

The passage of this law through the legislature was vigorously fought by an organized and expensive lobby, which was financed by an association of power and water companies. And no sooner was this water commission law passed by the legislature and signed by the governor than the same interests that opposed its passage organized and financed an expensive referendum campaign against it. For getting signatures to the referendum petition, which was circulated, among other places, in the redlight districts of San Francisco, Oakland and other cities, the hired petition circulators were paid 5 and 10 cents for each of the twenty odd thousand signatures, forged and unforged, to the referendum petition.

As conservationists of the fish and game natural resources of this state, every fisherman and hunter, amateur and professional, is interested in the ratification by the people, at the November election, of this referendum water commission law. For every citizen who is interested in the conservation of our fish and game is, of course, interested equally in the conservation of our waters, on the saving of which the conservation of our fish and game largely depends.

Further than that, every fisherman and hunter, amateur and professional, is interested, along with all other law abiding citizens, in the honest carrying out of our laws. One of these laws, which it has become quite fashionable to violate, because it appears to be entirely safe to do so, is the referendum. For it is claimed that wholesale forgeries and perjuries were committed in the matter of the petitions by which the redlight abatement, the blue sky, the non-sale of game, and the water commission laws were suspended on referendum. In fact, regarding the first of these referendumed laws, the district attorney of San Francisco has been quoted in the daily press as asserting that not only were many, many forged names attached to the petition by which it was suspended by referendum, and that many perjuries were committed in the verification of those signatures, but also that there was in his possession sufficient evidence of these crimes against the people to send the forgers and perjurers to the penitentiary. But, up to date, so far as appears to be publicly known, but one of these law breakers has ever been indicted, and the penitentiary seems to have no terrors to his fellow conspirators against the people.

Every honest California hunter, every honest California fisherman, and every other honest Californian interested in the conservation of our animated natural resources is, of course, interested in seeing crime suppressed and criminals punished. As it appears to be impracticable, if not impossible, to get sent to the penitentiary either those who forge signatures to referendum petitions or those who instigate and pay for those forgeries and perjuries, there appears to be but one other way in which honest men and women can rebuke such crimes. And that is by voting to ratify laws the referendumings of which is tainted with crime. In this way only, it appears, can honest people do their part toward rendering such crimes against the public and themselves useless and unremunerative and, therefore, unfashionable.

For if neither the actual lawbreakers shall be punished nor the instigators and financiers of the crimes shall be rebuked, then, of course, the referendumming of laws by criminal means will become a fixed, organized, remunerative, and recognized vocation. And instead of California being a government of the people, by the people, for the people, it will become a government of the people by perjury and forgery for those who are willing to employ organized bureaus of forgers and perjurers.

It is not so much a question as to whether the honest citizen agrees with the policy of the referendumed redlight abatement, blue sky, non-sale of game, or water commission laws, as it is a question of whether the honest men and women of California are willing to be governed by forgery and perjury.

Everybody, therefore, who votes against a law that has been referendumed by forgery and perjury, votes to make remunerative and, therefore, fashionable organized bureaus for the government of California by forgery and perjury. And everybody who votes against a law referendumed by a crime-tainted petition, simply because he disagrees with the policy of that law, is debarred from making any objection or outcry if and when a law, with the policy of which he agrees, is referendumed by forgery and perjury.

ATTEMPTS TO PROTECT THE SEA FISHERIES OF SOUTHERN CALIFORNIA.

By Charles Frederick Holder, Throop College of Technology and President of the Wild Life Protective League of America.

The writer has been observing the fisheries of southern California for nearly thirty years. In that time the supply has dropped off to a menacing extent, due to lack of laws, lack of protection, and over-fishing where fishes should be protected.

In 1886 the waters of southern California presented an amazing spectacle in the abundance of fishes, shellfish and crustaceans. One of the common fishes was the tuna, which has practically been driven away. The principal sea game and market fishes are:

White sea bass—*Cynoscion nobilis.*
Black sea bass—*Stereolepis gigas.*
Yellow fin tuna—*Germo maculata.*
Leaping tuna—*Thunnus thynnus.*
Albacore called long-finned tuna—*Germo alalunga.*
Oceanic bonito—*Gymnosarda pelamis.*
California bonito or skipjack—*Sarda chilensis.*
California barracuda—*Sphyræna argentea.*
White fish—*Caulolatilus* sp.
Sheepshead.
Swordfish—*Xiphias gladius.*
Sawfish—*Pristiophorus mitsukurii.*
Various rock bass—*Paralabrax* sp.
Halibut—*Hippoglossus hippoglossus.*
California yellowtail—*Seriola dorsalis.*
California whiting or surf fish—*Heterostomus xanthurus.*
White croaker—*Seriphus politus.*
Spotfin croaker—*Roncador stearnsii.*
Little roncador—*Genyonemus lineatus.*

The mainland shores of southern California are bordered with open beaches, and few of the large fishes approach them except at Redondo and other places where deep water approaches the shore. In the surf the surf fish is taken, but to secure most of the others, the angler must go out into the Santa Catalina Channel or the Santa Barbara Channel and troll. All the large fishes are found in greatest numbers about two groups of islands: (1) the Santa Barbara Islands in the channel of that name—Santa Cruz, San Miguel, Santa Rosa, and Anacapa; and (2) a group of islands in what the charts call the Santa Catalina Channel, about one hundred and thirty miles off Los Angeles County—Santa Catalina, San Clemente, Santa Barbara Rock, and San Nicholas. These islands lie so that each has a pronounced lee, particularly Santa Catalina, where, from seal rocks to the Isthmus, fourteen or so miles, the water is often like a lake, even though the island is thirty miles at sea. San Clemente Island, though forty miles off Orange County, also has a lee, but less than that of Santa Catalina.

All the large fishes described above were found in vast numbers by the writer at Santa Catalina Island in 1886, when there was but one boatman at that place, "Mexican Joe" (Jose Felice Presiado). As years went on it was evident that inroads were being made upon the fisheries. Boats went out with six or eight hand lines, and tons of fish were brought in and towed out to sea and fed to the sharks. To stop this the writer in 1898 organized the Tuna Club. The public supposed

it was a fishing or angling club to catch tunas, but the original institution, which I drafted with Mr. W. H. Landers, read:

The Tuna Club of Santa Catalina Island, California, is hereby formed and composed of gentlemen and ladies who have by their skill and perseverance succeeded in taking with rod and reel in the waters of this state, and with a line not larger than a 24-thread, one leaping tuna of not less than 100 pounds weight. The object of this club is the protection of the game fishes of the State of California and to encourage and foster the catching of all fishes, and especially tuna, yellowtail, sea bass, black sea bass, etc., with the lightest rod and reel tackle, and to discourage handline fishing, as being unsportsmanlike and against the public interest.

In a word, the movement was the first attempt to conserve the sea game fishes of southern California. I secured the co-operation or moral support of Gov. Roosevelt of New York, Gifford Pinchot, Chas. Hallock of New York, Dr. Henry Van Dyke, Senator George F. Edmunds, Henry E. Huntington, Admiral Peary, General John W. Foster, Stewart Edward White, Dr. David Starr Jordan, Lord Westborough, and others, who agreed with me as to the necessity of reform. Despite various tribulations, the Tuna Club enlarged its scope, eminent men became honorary members on my suggestion, and the organization became an influence for reform. The Tuna Club accomplished its object—protecting the fishes, by stopping the overcatch—and this was done by offering prizes to anglers for taking the *largest* fishes with the *lightest* tackle. An extensive and elaborate propaganda was worked out, which to-day finds expression in 6-ounce, 9-ounce, and 16-ounce rods, and 6, 9, 21 and 24-thread lines with which all the great game fishes of the region are taken.

The following are some of the particulars of the plan, interesting as showing how a great reform was accomplished:

TACKLE SPECIFICATIONS

TUNA CLASS.

Blue Button—Awarded to angler taking a tuna of 100 pounds or over, under club rules and tackle specifications of Blue Button class; and who is regularly elected.

Red Button—Awarded to angler taking a tuna of 50 pounds or over, under club rules and light tackle specifications; and who is regularly elected.

Swordfish, Gold Button—Awarded to angler taking a swordfish of 200 pounds or over under club rules and who is regularly elected.

NOTE.—Button open to light tackle competition.

TACKLE.

Tuna and Swordfish Class—Rod to be of wood, consisting of a butt and tip, and to be not shorter than 6 feet 9 inches over all. Tip not less than 5 feet in length, and to weigh not more than 16 ounces. Line not to exceed standard 24-thread.

LIGHT TACKLE CLASS.

	Buttons.		
	Bronze	Silver	Gold
Yellowtail	20-lb.	30-lb.	40-lb.
Albacore	20-lb.	35-lb.	50-lb.
White sea bass	20-lb.	35-lb.	50-lb.
Tuna	20-lb.	35-lb.	50-lb.

TACKLE.

Light Tackle Class—Rod to be of wood, consisting of a butt and tip, and to be not shorter than 6 feet over all. Butt to be not over 14 inches in length. Tip not less than 5 feet in length, and to weigh not more than 6 ounces. Line not to exceed standard 9-thread.

THREE-SIX CLASS

*An angler using three-six tackle is given a handicap of 25 per cent in his favor as against light tackle. Thus, a yellowtail of 16 pounds caught on three-six tackle earns a bronze button; one of 24 pounds a silver button; one of 32 pounds a gold button. The complete table follows:

	Buttons.		
	Bronze.	Silver.	Gold.
Yellowtail	16-lb.	24-lb.	32-lb.
Albacore	16-lb.	28-lb.	40-lb.
White sea bass	16-lb.	28-lb.	40-lb.
Tuna	16-lb.	28-lb.	40-lb.

TACKLE.

Three-Six Class—Rod to be of wood, consisting of a butt and tip, and to be not shorter than 6 feet over all. Weight of entire rod not to exceed 6 ounces. Butt not to be over 12 inches in length. Line not to exceed standard 6-thread.

BUTTONS—RULES.

BUTTONS.

A *bronze, silver* or *gold button* will be awarded to angler taking a fish of the weight specified above, under club rules and tackle specifications of light tackle or three-six classes, and upon payment of $2.50 entrance fee. This fee entitles holders of bronze buttons to exchange them for silver or gold buttons, when earned, without additional payment.

Swordfish Silver Button—Awarded to angler taking a swordfish under club rules and upon payment of $2.50.

NOTE—Anglers qualifying for the above buttons do not thereby become members of the Tuna Club.

RULES.

First—Anglers must bring fish to gaff unaided. The fish must be reeled in. A broken rod, either before or after gaffing, disqualifies the angler.

Second—An angler must fish with but one rod at a time.

Third—All catches must be officially weighed and recorded. The weights officially recorded are final unless protest in writing is made before the fish weighed is removed from the wharf.

Fourth—Tackle must be exhibited with the fish at time of weighing.

Fifth—Tournament is open to amateurs only.

Sixth—Membership in the club is limited to men.

NOTES.

a. By tip is meant that portion of rod from outer end of rod to point where same is grounded at butt, with tip fully seated.

b. An angler is not debarred from the use of lighter tackle than that specified under each class, if tackle conforms to club specifications.

c. Catches made on the standard 3-4-5 tackle are given the same recognition as to competition as catches made on three-six tackle.

Line—The standard set by this club for the line to be used under its rules, is as follows: The line to be a standard linen line, manufactured solely from the grade of linen yarn known in the trade as "No. 50."

*Applies to competition for buttons only.

Conditions Governing Award of Club Prizes. First—One prize only will be awarded to an angler. *Second*—If an angler should qualify in two or more species of fish, he may take his choice of prizes in those classes. *Third*—If no fish of gold button, blue button or red button size is taken, a silver prize will be awarded for the largest, and a bronze prize for the second largest fish taken.

The result of all this was to materially reduce the catch.

In 1886 men landed a tuna with a handline in five minutes. In 1898 I took a tuna of 183 pounds with a 16-ounce rod, 21-line, but it took me four hours. From twenty minutes to half an hour is now expended in landing big game fishes with "light tackle," hence a revolution has taken place. The catch has been reduced, no more fish are wasted, and at Santa Catalina we find a standard of sport that has gone around the world.

The angling here in 1886 to 1900 was the most remarkable in the world, and I say this advisedly; but with the coming of power boats the seines, trawls and other nets, the fisheries began to decrease until it was evident that something must be done. The most menacing danger was the alien who attached a gill net to the kelp and ran it out into the sea. Fifty such nets have been counted in a mile and a half, and from Seal Rocks to the Isthmus, Santa Catalina Island, practically twenty miles, scores of nets were placed every night for years, while vast purse nets took ten and twenty tons of sardines in the bays at the same time; thus an army of aliens were not only over-netting the great game and market fishes, but were taking the food of the fishes (sardines) in vast numbers. In the meantime from fifty to one hundred angling boatmen established themselves at Avalon, representing with various industries, dependent upon angling, an investment of three quarters of a million dollars.

The fine angling attracted people from all over the world, and that these boatmen had specific rights is shown by the following letter from the United States Fish Commission:

DEPARTMENT OF COMMERCE AND LABOR, BUREAU OF FISHERIES,
December 26, 1912.

PROFESSOR CHAS. F. HOLDER,
Pasadena, Cal.

SIR—In reply to your letter of December 11th, you are informed that in the opinion of the bureau it is a proper policy to preserve for angling any waters in which fishing for sport greatly predominates over the commercial fisheries, as the prosperity of the adjacent communities is more affected by the expenditures of sportsmen than by the revenue derived from the capture of a comparatively small quantity of fishes for food purposes only. *It is also highly important to both the angling and commercial fishery interest that the fishes should not be disturbed on their spawning grounds.*

Although the bureau has no recent knowledge of the conditions obtaining on Santa Catalina and San Clemente islands, it appears from the statements of Dr. Jordan that these two considerations would be subserved by the proposed measure to establish a fish refuge within territorial waters adjacent to the two islands, and with that understanding the bureau gives the proposition its endorsement.

Respectfully,

H. M. SMITH, Acting Commissioner.

But the rights of the taxpayers were disregarded. The bay of Avalon and spawning grounds of the sardines was looted day and night in season and out, and the supply decreased to almost nothing. The looting continued until 1913. Several attempts had been made in previous years to obtain protection from the state.

In 1913 I was asked to make a report on the island fisheries. This was made the basis of a bill and in that year Mr. E. W. Hedderly, the editor of "Western Field," and Mr. R. D. Duke, of the California Fish and Game Commission, framed a law making Santa Catalina a fish reserve.

Years previous to this I had taken various experts over the ground—Dr. Van Dyke, Gifford Pinchot, Dr. David Starr Jordan and others. All agreed that this locality was a spawning ground for all, or nearly all, the great game and market fishes of southern California. The following are some of their letters:

DECEMBER 27, 1912.

GAME COMMISSION OF THE STATE OF CALIFORNIA,
Sacramento, California.

GENTLEMEN: I understand that there is a movement on foot to set aside the waters within three miles of San Clemente and Santa Catalina islands as a fishing refuge and to prevent all fishing within it, with the object of furnishing undisturbed spawning grounds, and thus increasing the supply of food fishes. To me this plan seems admirable in every respect. For a number of years I have been fishing about these

A Record Leaping Tuna; weight, 175½ pounds; time, 2 hours, 30 minutes
The Tuna is one of the fastest of the sea fish.

islands and may fairly be said to be familiar with the general conditions in their neighborhood. I am confident that this matter is of the greatest importance for the conservation of the sea fishes of California, but what is of vastly more account, Dr. David Starr Jordan, I learn, is of the same opinion.

I hope that the efforts of the anglers of southern California to protect the food fishes of their region will be successful, not merely because of the importance of the proposed action for angling for sport, but equally as to its importance to the professional fishermen in the future, many of whom, as you know, do not look beyond the present.

Very sincerely yours,

GIFFORD PINCHOT.

UNIVERSITY OF CALIFORNIA,
MUSEUM OF VERTEBRATE ZOOLOGY,
BERKELEY, CALIFORNIA, December 27, 1912.

PROFESSOR CHAS. F. HOLDER.
Pasadena, Cal.

MY DEAR PROFESSOR HOLDER: I am greatly pleased to learn that a movement is on foot to set apart Santa Catalina and San Clemente islands as fish and game preserves. If consummated, this will mean the saving of not only the species of fishes peculiar to those waters and now threatened with extermination, but preservation of the land fauna as well. The latter, as you well know, includes many species of birds and a few of mammals, which are of great interest to the naturalist, because they show differences from corresponding species on the mainland. In other words, the islands have been, and are, speciation centers.

It is of the greatest importance, therefore, from the scientific as well as the aesthetic standpoint, that the fishes and other animals of the islands be conserved from any danger of extermination, or even undue disturbance.

I hereby assert my hearty approval of the plan to make Santa Catalina and San Clemente islands fish and game refuges. Count on me to support the proposition in every practicable way.

Very truly yours,

J. GRINNELL,
Director of the Museum.

DEAR SIR: During my recent visit to Santa Catalina Island, I was deeply impressed with the threatened danger to the commercial and valued sport-giving fisheries at the island.

I quite agree with the stand taken by Dr. David Starr Jordan and Mr. Gifford Pinchot and others, that this island for three or four miles off-shore is the spawning ground of the valuable food fishes of southern California, and particularly of Los Angeles, and that this region should be protected absolutely from all kinds of nets or lines handled for commercial or market purposes. In a word, the waters should not be disturbed by the market men within this limit: The spawning ground of tuna, white and black sea bass, whitefish, rock bass, sardines, and at least fifty more kinds of fish.

Another important feature is the kelp beds about the islands. These are the refuge and spawning beds of many valuable fishes and should remain inviolate. Santa Catalina island should be as undisturbed as your water supply, as it is a great food fish supply of southern California and Los Angeles.

Our society has saved the palisades of the Hudson from vandals, and we hold that we can aid you in calling the attention of the whole people to this gross devastation of a source of supply by market fishermen, who are ignorant of the situation and of course look out only for the day.

Believe me, very truly yours,

GEORGE F. KUNZ.
President of the American Scenic and Protective Society.

Pelagic fishes like the tuna, albacore and bonitos doubtless spawn on the surface, but I am confident that they spawn in-shore in the lee. In fact, I have taken spawn from nearly all these fishes within two miles of Santa Catalina. It is stated by some that the albacore does not spawn here, but this is a mistake as the spawn has been taken from albacore off Avalon by intelligent fishermen who will make affidavit to that effect, and Dr. Jordan states that all the fishes spawn here.

DECEMBER 5, 1912.

DR. CHAS. F. HOLDER,
Throop College of Technology,
Pasadena, Cal.

DEAR SIR: I trust that you may be successful in having Santa Catalina and San Clemente islands set aside as game preserves. These two islands and the smooth waters off their shores are the spawning grounds, above all others, of the greatest

Record Yellow Tail, weight 72 pounds 3 ounces. The Yellow Tail is not only one of the great game fishes, but is also a fine food fish.

game fish in the country. The white sea bass, the great jewfish, the spearfish, swordfish, tuna, bonito, albacore, the Japanese tuna (yellow fin tuna), all spawn on the rocky and other places about these islands, as well as a multitude of smaller fishes valuable to the angler or to the markets.

Many of these fish spawn in the kelp which surrounds these islands. The netting carried on in shore disturbs these fishes at spawning time, and it is said that there has been a very marked falling off of these species. At Avalon, on Santa Catalina, is the great center of big game fishing, the disappearance of any of these species makes a great loss to the people who have investments there as well as to the visitors who come there for fishing purposes.

It is desired to prohibit the use of seines and all nets for market purposes within three miles of the shores of either of these islands. This allows the professional fisherman the entire Santa Barbara channel, Santa Rosa, San Miguel, and the rest comprising the Santa Barbara group.

I trust that you and our friends will be successful in getting the statute passed which shall protect these islands and set them apart as spawning grounds for the great game fishes of southern California.

Very truly yours,

DAVID STARR JORDAN.

My belief is that owing to its peculiar location, its smooth water, etc., Santa Catalina is a natural spawning ground, hence a natural source of supply to the waters of southern California, and as such should be zealously protected from any disturbance of nets.

I asked that the reserve consist of *five miles* off the shore of the islands of Santa Catalina and San Clemente, the latter owned by the government, and all the authorities agreed with me. The Tuna Club, however, requested that San Clemente be omitted. In 1913 this law passed making Santa Catalina and three miles off shore a fish reserve, stopping all netting in its waters, but allowing market fishermen the use of the hand lines or rod. This met with opposition from the marketmen, and in the mean time varied fish industries had sprung into being—sardine canneries, tuna (albacore) canneries, market fishermen for big fish, and others, all of whom had conflicting interests and all of whom objected to Santa Catalina and San Clemente being made a reservation as it was the most convenient place to get the fish and to catch sardines.

The law establishing a fish reservation at Santa Catalina became operative in August, 1913, and read as follows:

(PENAL CODE.)

634½ Every person who takes, catches, or kills any fish except with hook and line in the manner commonly known as angling within three miles of shore line of Santa Catalina island, is guilty of a misdemeanor. Every person found guilty of any of the provisions of this section must be fined not less than twenty dollars nor more than five hundred dollars, or be imprisoned in the county jail of the county in which the conviction shall be had, not less than ten days nor more than one hundred and fifty days, or be punished by both such fine and imprisonment; and all fines or forfeitures imposed and collected for any violation of any of the provisions of this section must be paid into the state treasury to the credit of the fish and game preservation fund. Nothing in this section prohibits the United States Fish Commission and the Fish and Game Commission of this State from taking at all times such fish and in such manner as they deem necessary for purposes of propagation or for scientific purposes.

The effect of this was magical. I have just returned (July 2, 1914), from an inspection of the kelp beds and waters of Santa Catalina with Mr. R. D. Duke, attorney of the California Fish and Game Commission, and not in twenty-five years have I seen so many fish there, of all kinds except the tuna. If these fish are allowed to spawn and remain undisturbed, in a few years these waters will be replenished and will

assume their original productiveness and will constitute such a prolific supply for all southern California that there will be a pronounced reduction in the price of fish in the markets of Los Angeles.

It would be difficult to find an intelligent man in America who would not agree with this statement. It is self-evident and important to everyone, yet, owing to the diversities of interests, the canners and the market fishermen of Los Angeles desire to wipe these laws out, on the ground that they want to take fish as near port as possible. The canners desire to haul for sardines at the island as they need them as bait to catch the albacore in mid-channel. Hence certain ones have attempted to test the law and have been arrested. Mr. Duke seized three seines in the trip referred to.

In the summer of 1913 the market men of San Francisco began a campaign to throw open the markets to all game. A society was organized and over 30,000 signers to a referendum petition on the non-sale of game law were obtained. Encouraged by this they circulated in June, 1914, an initiative petition calling for the placing on the market for sale of all game and fish, despite the fact that every intelligent man in California knows that this would produce an army of market hunters and fishermen which, in a few years, would wipe out all the game and fish of the state. Fortunately they failed to obtain the requisite number of signatures and the plan was given up.

The San Pedro market men (500 in number) asked this association to annul the Santa Catalina reservation. The present writer on learning that it was proposed to literally throw everything open, took the matter up with the association and succeeded in inducing them to allow the three-mile law to remain undisturbed. Some of the boatmen of Avalon and the canning interests requested a proviso enabling them to take bait at Santa Catalina, bait being presumably sardines. Such a provision was included in the initiative, allowing men to haul seines under the direction of the Fish and Game Commission. If the bill were passed and the letter of the law observed this might not interfere with the large fishes. It is not advisable, however, to interfere continually with the spawning sardines, the natural food of the food and game fishes, and it is a question whether, out of two hundred boats which might visit this reservation, some would not break the law under cover of obtaining bait. That they might is shown by the fact that Mr. Duke seized three set nets at Santa Catalina in the last week in June, 1914. In spite of this, some boatmen at Avalon desire to net for bait (sardines) and would take the chance. I have no question as to the good faith of the gentlemen at the head of the canning companies.

Such is the condition of affairs in southern California so far as the large marine fisheries are concerned. The leaping tuna that has practically been driven away, appeared in limited numbers, after ten months of the "three-mile law," as did many other fishes that have not been seen for fifteen years.

The outlook for the valuable interests of the boatmen of Avalon was distinctly encouraging, yet the alien market fishermen of San Pedro would, without the slightest hesitation, wipe out a law which every intelligent citizen knows is righteous, productive of good, and absolutely necessary.

As a citizen and taxpayer of California I have been proud of the economic development of California and have aided it as I could. I believe in developing all the sea products, intelligently, saving for the people everything that can be used; but it is very evident that the people cannot trust the army of alien market fishermen to conserve American interests. They do not understand the meaning of the word. The people must conserve wild life, fish and game, or it will disappear. The alien market man and some Americans have no interest or patience in this. Ignorance and avarice often go hand in hand and the people of California must protect themselves from this combination, or their

World's Record Catch of Sword Fish at Santa Catalina Island, September 14, 1912. The largest one weighed 202 pounds

most valuable products will go to waste or to the enrichment of the few. It is not the object of this paper to suggest remedies, but to point out that it has taken years to obtain the primitive reforms we have or stop the extinction raids of aliens and it is significant that after ten months' trial these men would revoke one of the best laws for the conservation of the fisheries any state has had.

It is not California alone that confronts this problem. The valuable shad fisheries of the east are threatened. The *entire* season's catch of shad in the Chesapeake Bay in 1914 did not equal that of *one day* in 1900. The market men were told by the United States Fish Commission, that if they would allow 10 per cent of the migratory fish to go up the rivers, this would insure them a livelihood and a catch the following year, but the men were so densely ignorant, their brains so clodded with avarice, that they preferred to take the last shad and face

rum, just as the duck shooters for the market preferred to get the last duck, and shoot themselves out of business in their campaign of extinction.

What is the remedy? It is evident to any one having any brains, that such persons are a public and private menace. They strike at the state's most valuable asset, its food supply, and they should be stopped by the strong hand of the people, who should in turn stand behind the game laws and see that they are not tampered with by initiative and referendum petitions. The legislature is the only place to make or unmake game laws, as there all classes can go and present their side and fight in the open for what they consider their rights. The Fish and Game Commission needs more funds. At present its only income for the vast scheme of propagation of trout and other fish comes from fines and licenses. It should, at least to my mind, have a large appropriation for this. But the most important feature is protection. It is a waste of time and money to make laws and not have adequate funds for their enforcement. The state should have a fast, sea-going launch at San Pedro to guard the waters of Los Angeles County, and half of the maintenance should be provided by the county. The Santa Catalina fish reserve with its sixty miles of coast line and its valuable fishes should be policed along its sea board by the citizens of Avalon as well.

San Clemente Island, belonging to the government, has no protection and will be looted in the same way unless patroled. None of these islands have light houses. Smugglers have used them for years. A revenue cutter should be stationed at Los Angeles port permanently. Officials in the east are unable to understand the extraordinary growth of this region. It was an impressive moment, when one of the most distinguished men in the east asked of a friend of the writer, if the Gulf of California was navigable. Los Angeles has been neglected. It should have had a garrison and fort ten years ago. The government has overlooked its fisheries. Its abalones and crawfish are almost gone. People attack the fish and game commissions instead of trying to aid them. In fact, the time has come when it is the duty of the people of California to familiarize themselves with their own possessions and take a hand in the business. If they do not the horde of ignorant aliens which will come in through the canal in the next decade, a legion that never heard of "game laws" or "conservation," will sweep California of every living thing, fish, fowl and hoof, that by any twist of the imagination can be construed as food.

It should be understood that the efforts of the Tuna Club are directed toward penalizing, as far as size of line and weight of rod is concerned, it own members, and is not designed to restrict the ordinary fisherman. Any one is still at liberty to use any kind of tackle he desires, but such regulations as are used by the Tuna Club are certainly productive of the finer class of sportsmanship and are beneficial as means of preventing large catches.—EDITOR.

BIRD LIFE AS A COMMUNITY ASSET.

By JOSEPH GRINNELL, Museum of Vertebrate Zoology, University of California.

Students of natural history have become fully aware that as the country is settled marked changes take place in its bird life. A few of our species, such as the linnet and mockingbird, have become more numerous than they were in the early days. But very many more have become noticeably scarcer; some have disappeared altogether. Bird life as a whole has diminished in quantity to an alarming degree.

Those who have made a scientific study of our bird life have come to the conclusion that it has a distinct value to human interests. This value consists first of all in the well established economic bearing of birds upon agricultural interests; 90 per cent of our birds occupy an important position in maintaining the balance of nature, by which they serve to check abnormal increase in plant-eating insects and excessive multiplication of weeds.

Then there is the dollars-and-cents value of game birds—not in their market value, because we believe that market hunting will soon be a thing of the past—but because their pursuit, whether by the shotgun exponent or camera hunter, involves large commercial dealings through transportation and equipment. It is believed that a very large value pertains to bird life as an object of pursuit for whatever purpose, because this pursuit leads to wholesome pleasure and hearty outdoor exercise on the part of many people who live otherwise sedentary lives.

There is, again, that refreshment to the mind resulting from contemplation of birds as possessors of pleasing form and plume, cheerful manner, and attractive song. This brings an active appreciation on the part of the majority of mankind. In this rôle, birds at large have an important esthetic value.

Another point to be considered is the principle that to allow complete extermination of any living thing is out of harmony with an enlightened consideration of the future. Our successors will not approve of our thoughtlessness in completely destroying the California condor any less than we deplore the wanton destruction of the great auk by our ancestors. In other words, it is now generally recognized as ethically wrong to jeopardize the existence of any animal species.

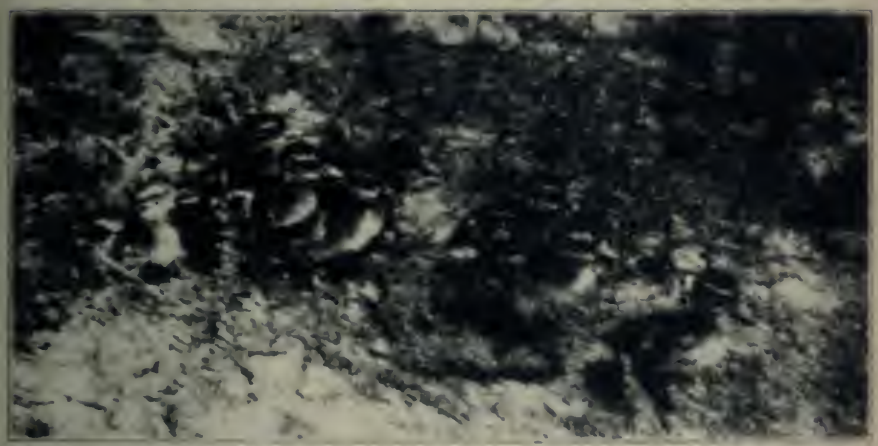
Yet one more value of our bird life, and one which I urge as being worthy of most serious consideration, namely, the inherent value of birds in educational work with children. We hear nowadays of all sorts of systems—the Montessori, for example—which are designed to hasten the development of alertness and precision in exercising the senses. Can any objects be better adapted for just such purpose than birds—with their multifarious colors and color patterns, their variety in form, their quickness and peculiarities in movement, their range of voice. And, of all the systems of early education, this is the primitive one, the one most in accord with the normal development of the child, because of long standing, ancestrally.

When we come to weigh together all these valuations—economic, esthetic, educational—is there justification for anyone's claiming that attention to conservation of bird life is of trivial importance? Is this subject not most emphatically worth the consideration of thrifty, busy people?

I must insist that conservation of bird life is of equal import with that of any of our other natural resources. It is dollars-and-cents economy, not only to stop waste but to take steps to maintain an optimum of value as regards *this* asset—in other words, to maintain a large principal, upon which an undiminished income can be realized as time goes on.

What steps are to be taken to keep our bird population so that it may serve its highest usefulness to mankind? I believe that it *is* feasible to maintain it, and I am not arguing from a sentimental standpoint, either, but from a utilitarian standpoint.

Some of the factors correlated with the settling up of the country, and which are adverse to the persistence of an abundant native bird population are—first, in my opinion, the ravages of the house cat. No matter how well fed your tabby may appear, she is by nature a nocturnal marauder, gifted through keenness of hearing, eyesight, scent, and unquenchable instinct to search out and destroy young and old birds. I am confident that an enormous annual toll upon bird life in our



Downy young of Pileated *Dryobates pubescens*. Los Gatos, Santa Clara County, May 21, 1916.
The Pileated woodpecker is now almost extinct in California.

suburban districts is exacted by the house cat. In the country, where it is known that many cats have gone wild, they constitute a big factor against the birds. There is abundant proof to support this assertion in the experience of those of us who tramp the hills and bottom lands in quest of facts and laws of wild life interrelationships.

The second most important factor over a large part of the country is the invasion by the English sparrow. This interloper appropriates food and shelter rightfully belonging to the native birds, and sooner or later crowds them out. Southern California is now in a critical period in that the English sparrow has but recently arrived. If we are to prophesy subsequent history from that which has been repeated over and over again in the eastern states as this bird traveled from east to west, we are doomed to be overrun by English sparrows, unless drastic measures against them be taken at once. Now, while they are still few in numbers, is the time to combat this nuisance effectively.

A third factor is the reduction in food supply due to the reclamation and cultivation of wild lands. This affects our native species of birds inevitably, but it can be counterbalanced to a considerable extent by the

use as ornamental shrubs and garden flowers of such kinds of plants as will produce suitable food for the birds. The fourth factor against the birds is the thoughtless destruction of them, for fun, as by the not infrequent gunner who shoots swallows and swifts because they afford a favorable target; to eat, as by the Italian immigrant, who sees in the smallest bird simply its value as a mouthful of food, to be netted or shot in as great numbers as possible; and by the uninstructed small boy, who robs bird's nests far and wide merely for the exhilaration of discovery and appropriation. Lastly, the exploitation of birds for commercial purposes, to be sold in the market as food, or, worse yet, so that their feathers may serve to adorn hats—still exists to a much larger extent than many of our citizens suppose. The lure of the dollar justifies any means to obtain it that can be devised on the part of certain unthinking members of society. It may not be that the wings of the terns destroyed along our beaches are used in millinery *here*. They may be shipped to London and used there as "foreign" birds. But we, in our turn, are catering to bird destruction somewhere else if we buy in our local millinery stores plumes, or wings, or feathers of so-called "foreign" birds.

Every one of the above adverse factors is such as can be either eradicated entirely or can be mitigated to a very large degree. The cat question must be solved by the licensing and control of pet cats and the extermination of homeless ones—precisely the same treatment which is now accorded the dog in most of our cities.

The English sparrow must be dealt with systematically and rigorously. Call the English sparrow a foreign *weed*, if you will, the undue spread of which must be continually fought. We maintain an army of caretakers along our streets and in our parks so that the attractive flowers and shrubs are not choked out. Is it not exactly as good sense to maintain one or more properly qualified employees in each city to see to it that by trapping or shooting or poisoning—whichever method proves most effective—the English sparrow population is kept down below the point where it is distinctly deleterious to our native birds, even though complete extermination of the pest may never prove possible? The diminution in natural bird food and disappearance of springs can be compensated for privately, and publicly as in parks, by providing food and watering places, just exactly as a lawn or a flower bed may be supplied at regular intervals with concentrated fertilizers, and daily sprinkled. To my mind, the attractiveness of our bird life—in other words, the esthetic feature in its value—warrants consideration for the same reasons as the flower garden. Care and attention must be bestowed on both.

Finally, to lessen or remove the factor of thoughtlessness, or ignorance, or commercialism, we have state and federal regulations. These are, at the present time, approaching the ideal. We need, and for the most part now secure, conscientious enforcement of this legislation on the part of our officers of the law. But efforts toward enforcement have often been observed to be futile unless the people at large have been led to see the wisdom in these laws. Hence we must have popular education as to the features and value of our bird life. One natural channel for such education, by which adults as well as children are to be convinced of the facts in the case, is the school, where bird study should be incorporated as an essential element in the grade curriculum.

Our bird life is a valuable public asset and deserves sane consideration as such.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical, and similar periodicals.

All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California.

OCTOBER, 1914

OUR PROGRAM.

THERE are two ways of enforcing laws—one is to punish violators, and the other is to educate people to a realization of the need and value of the law so that public sentiment demands its observance. The former method was used in the time of Nero and still needs to be used for the laggers of civilization. The relative value of the "rule with an iron hand" and the "rule with reason" has been too often discussed to use space for it here. The thing to be noted is that the California Fish and Game Commission is beginning a campaign of education in an endeavor to so educate public opinion that protective laws may in the future become relatively unimportant. Most of the violators of the game laws, if brought to a real appreciation of the law itself and the need for it, would obey rather than disobey the law.

A department newly formed might well be called a bureau of education and publicity. Dr. Harold C. Bryant, Assistant Curator of Birds in the University of California Museum of Vertebrate Zoology, has been placed in charge of the work. Dr. Bryant is well equipped for his new duties, for not only has he had a long university training, but he has spent several years in research work on the game birds of the state and through extensive traveling is well acquainted with conditions throughout California.

The function of this bureau will be to find ways and means of protecting foreign and domestic game birds within the state and to dispense information relative to game by means of correspondence, public illustrated lectures, and by the issuance of bulletins dealing with the status of fish and game. A study will also be made of the habitats, habits and breeding seasons of the different game birds and mammals of the state so that a basis for sane game laws may be afforded.

As one means of educating the public to the need and value of game conservation the Commission is beginning the publication of a quarterly bulletin devoted to the interests of the fish and game itself, to those who pursue it, and to those who simply take an interest in it as a valuable endowment of the state. Every effort will be made to not only make the publication of interest to every one, but to further, in every way possible, the present day movement for the conservation of wild life. The wild game resources of the State of Maine are said to bring an influx of thousands of people into the state each year and to increase the business of the state to a sum not less than fifteen millions of dollars. California's game resources can be made just as, if not more, valuable to this state. This can only be done, however, by conserving these resources for the use of, not only ourselves, but of those who come after us.

This publication will stand for every measure which will help in conserving our game resources. That fundamental law of game conservation, "the preservation of the needed breeding stock," will be one of the ideals toward which we will work. Such measures as may be urged from time to time may seem rather harsh to some, but it must be remembered that it is high time we were becoming alarmed in regard to the status of our game. We will always endeavor to stand for those measures which are absolutely necessary and which we are sure will accomplish the desired end.

As one of the best measures of conserving California's game we believe in state game refuges and will urge the establishment of game refuges throughout the state.

We believe, also, that the breeding and propagation of game birds and mammals should be encouraged. At the present time there is a demand by hotel keepers for pheasants and they are glad to pay from $2.00 to $3.00 a piece for them. The market supply is very small at pres-

out in this state. Encouragement along these lines would furnish many people with a profitable occupation, and would do much to ease the conditions following the passage of a non-sale law.

Although this quarterly will be the medium of publication used by the State Fish and Game Commission and will often directly express their views, yet, they will not be responsible for the personal opinions expressed by signed writers in the periodical.

The Commission is anxious to give publicity to the work which they are doing. Reports, financial and otherwise, will be expended so that full knowledge as to the source and amount of their revenues and the nature of their expenditures may be known.

The material required for several of the departments is dependent very largely on people interested in game conditions in different parts of the state. The success of these departments depends very largely upon the interest which people will take in furnishing material for them. If deer are rapidly decreasing in your county, will you not write up a note and send it to the editor? If you discover the nest of a grouse or other game bird, will you not take careful notes as to position of nest, kind of material, number of eggs, and date on which found, and offer it to us for publication? Heretofore, much valuable information regarding our game fish has been lost forever simply because no notes were taken and no permanent records made. Remember that records of arrivals and nesting depend upon three important items—exact location, date and character. Keep on the lookout for interesting observations and good photographs for California Fish and Game.

THE FEDERAL MIGRATORY BIRD LAW.

Conservationists have been watching the fate of the federal migratory bird law. Court decisions exactly opposite in character have been received from different parts of the country. The attitude of the California Fish and Game Commission is expressed in the following telegram recently sent to Mr. H. W. Henshaw, Chief of the United States Biological Survey, and his reply:

SEPTEMBER 18, 1914.

H. W. HENSHAW,
Chief, Biological Survey,
Washington, D. C.

What provision made for enforcement Federal Migratory Bird Regulations in California? Unless different action requested by federal authorities this Commission will enforce regulations drastically with sixty-five wardens. United States Attorney ready for prosecutions. Wire our expense.

(Signed) FISH AND GAME COMMISSION.

WASHINGTON, D. C., September 19, 1914.

FISH AND GAME COMMISSION,
Mills Building,
San Francisco, Cal.

Greatly appreciate cooperation enforce migratory bird regulations vigorously. Appointment new inspectors dependent on examination held last week.

(Signed) HENSHAW.

COMMENDATION.

The following are quotations from a letter received from Mr. Henry Chase, the well known author of books on the conservation of fish and game:

Owing to a little interest in the cause of preservation of our fish and fauna, it is a source of great satisfaction to me to learn that the California Game Commission has established an official bureau of information and publicity. Especially is this true at the present time when I am informed that through your initiative and referendum laws there is danger of your wild life being totally exterminated by the enactment of unwise measures. And at this juncture I congratulate both the Commission and the state in placing such a bureau in so capable hands as those of yourself. This is, indeed, encouraging. • • •

I recognize that the people of California, as a class, are a well informed community, but proper knowledge on the subject of game preservation is not possessed by the people as a whole in any state in the union. Hence, the urgent necessity of such a bureau as yours.

In your letter the plans you outline for your bureau form a perfect model according to my notions and experience. • • • The scientific truths, combined with a practical knowledge of the working of proper laws, are the essential things—undoubtedly. You have many practical game officers in your state who are thoroughly familiar with local conditions and whose knowledge in this respect will be of much value to your bureau.

I am certain the program you have mapped out is the correct one and is being pursued in other states. Correspondence, press articles, bulletins, pamphlets, and lectures are the ways of reaching your public. Also cloth posters in the forests, parks and public places are valuable aids.

I wish you an abundance of success and good luck, and am sure you will have it, too, and be surprised at your own accomplishments in due time. In the mean time I will do what I can to keep you in touch with other bureaus.

GAME PROTECTION AND PROPAGATION IN AMERICA.

If courses in game protection and conservation should be given in our universities, and colleges, and there is no question but that they should be a part of the curriculum, it would be difficult to find a suitable textbook. The best thing we have yet seen which would be available for such use is a recent book by Henry Chase entitled "Game Protection and Propagation in America" (J. B. Lippincott Company, Philadelphia and London. Sept. 1913. x, 1-258). Mr. Chase, with his long experience as a game warden, is well qualified to write "a handbook of practical information for officials and others interested in the cause of conservation of wild life."

One of the strongest chapters in the book is the first one entitled "Educating the Public—a Foreword." In this chapter Mr. Chase points out that the most pressing need of the hour to forward the great movement of conservation of wild life is education. He states further: "The federal authorities are always happy, and it is their duty, to co-operate with those of the states in their work for better game protection. So it is manifest what should be done. Connected with the game department in each state there should be a bureau of education and publicity, presided over by an expert. With these bureaus co-operating with each other and with the national one, a campaign of education along correct lines can be conducted which will accomplish more and better results in a few years than has been done altogether in the past. This plan would be no experiment with which to waste state funds either. It has now had the benefit of years of trial; it has been systematized; it has a well-defined and definite course to pursue; and has not been found wanting in efficacy. Unquestionably, nothing can be of more value to the cause of game protection at this time than a systematic campaign of education conducted officially by the game department in every state in the union, and an extension in the work on that line now being performed by the federal bureau. It is earnestly to be hoped that such a campaign may be started forward."

Certainly Mr. Chase has gotten at the root of the matter, for when the value of birds and the need of their protection and preservation is really appreciated, protective laws will be comparatively unimportant.

The following chapter headings give a good idea of the scope of the book:

Why Protect the Game?; Relations of Birds and Mammals to the Natural Resources; Present Meaning of the Term "Game Protection"; Brief Survey of Game Legislation in America; "Sane, Simple and Scientific Game Laws"; Federal Protection of Migratory Birds; Protection of Birds by International Treaties; State Laws and Their Enforcement; Field Work of Game Officers; The Right of Private Property in Game; Restocking Game Covers; Propagation of Game Fish; Feeding Game During Severe Winters; Hunting Accidents.

An appendix furnishes a typical constitution and by-laws for game clubs.

To any one seeking knowledge of game protection and propagation in America no better source can be found than this excellent treatise by the well known author of "Powers, Duties and Work of Game Wardens," "Modern Doctrine of Game Protection," and "Private Preserves in America." H. C. B.

A PLAN FOR USING THE REVENUE FROM LICENSES.

Mr. Henry Chase, writing in "Forest and Stream," August 29, 1914, suggests that the revenue from fish and game licenses should be divided into the following three funds:

1. A certain sum to be used in more effectual enforcement of proper protective law.

2. A portion for restocking the waters with fish and the covers with game.

3. A balance set aside for establishing game refuges.

He goes on to say: "A new refuge established annually, in course of time will bring immense tracts of land into the possession and under the control of the state, and be the ultimate savior of both the game and fish if all other expedients should fail. This is the most vital part of the whole program."

LIVE GAME PRICES

The demand for propagated live game birds and mammals for use in parks and as food for the table is steadily increasing and is aptly shown by the following prices quoted by "The Game Breeder," (August, 1914):

Deer $20.00 and up.

Wild turkeys, gobblers, $10.00; hens, $20.00.

Ringed-necked pheasants, $5.00 and $9.00 per pair for Mongolian and Prince of Wales cross.

Ruffed grouse, $5.00 to $10.00 per pair.

Quail $15.00 to $20.00 per dozen.

Mallards $3.00 to $3.50 per pair.

Black ducks, $3.00 to $3.50 per pair.

Wood ducks, $10.00 to $15.00 per pair.

Gray partridges, Hungarian and English, $7.00 to $8.00 per pair.

Wild duck and pheasant eggs, $20.00 to $30.00 per hundred.

OUR VANISHING WILD LIFE

There are always many people who are hungry for definite knowledge on certain subjects in which they are particularly interested. As a rule there is so much literature on a subject that it is hard to know where to begin. We are glad that there has recently appeared a work which can be considered a summary on the subject of wild life conservation. We refer to Dr. William T. Hornaday's recent book: "Our Vanishing Wild-life," Scribner's, New York, 1913. The book is really a campaign document and it can be compared, as far as influence is concerned, with Stowe's "Uncle Tom's Cabin," at the time when another great forward movement was in progress. A friend of conservation has placed this volume in almost every library in the state that did not yet have it so that it is now obtainable even though you do not purchase it for your own private library.—H. C. B.

A DEPARTMENT OF COMMERCIAL FISHERIES.

On account of the recent rapid increase in the value and importance of the commercial fisheries of California, the Fish and Game Commission have deemed it advisable to create a department to handle the main problems connected with these fisheries. The primary object in view is to conserve and at the same time assist these industries and so far as possible to encourage the development of fisheries that have been neglected.

Only a few years ago the California sardine which visits our coast in countless numbers, was little used and almost despised, with no other reasons than it would not ship well in the fresh state and that it was so very plentiful and cheap. Private enterprise without the help or encouragement of either the Federal or State Fish Commissions, has now developed a sardine canning industry in California that is growing with leaps and bounds. Three canneries are now operating with a combined capacity of one hundred tons of sardines a day and the capital invested is approximately $100,000. By the end of the present year the number is to be doubled. Another of our neglected resources was the long finned tuna or albacore of Southern California, which, up to three years ago was little used as food. There are now eleven canneries putting up this fish and there is capital invested to the amount of $200,000 in canneries and an equal amount in boats and fishing gear. The pack for 1913 was 128,000 cases and it is estimated that the 1914 pack will reach 300,000 cases of a wholesale value of over $2,000,000.

These are but examples of what can be done with other varieties of fish and mollusks now neglected on our coast.

Among the duties of this new department will be the gathering of statistics and data relative to the take of different varieties of fish, the methods of fishing, handling and marketing. Also gathering information about the little used sea foods which may become of commercial importance, the utilization of waste fish and fish offal for fertilizer, fish oil, glue and chicken feed, will be subjects for investigation as will also be the habits, migrations and spawning times of the different varieties of fish, so that in case it becomes necessary, they may be protected by restricting the fishing or by establishing closed seasons.

It is expected through the activities of this department to gather and place on file accurate information on these different subjects, from which it will be possible for the Fish and Game Commission more intelligently to foster and encourage these industries; to propose

beneficial legislation and on the other hand to prevent legislation that may unjustly cripple any of the fisheries and to so regulate the taking of fish that the supply may not be exhausted.

California has in its immense stretch of sea coast a source of marine food supply that we are just beginning to appreciate. That this source of food, one of the state's greatest assets, can be developed to an infinitely greater degree than at present, there can be no doubt. To develop and conserve these resources is one of the greatest future tasks of the Fish and Game Commission.

This new department will be in charge of N. B. Scofield assisted by H. B. Nidever.

Lake on north branch of Big Pine Creek (elevation 10,000 feet), Inyo County, California. Recently stocked with Loch Leven Trout.

CONSERVATION IN OTHER STATES.

HUNGARIAN PHEASANTS IN OHIO.

In spite of California's apparent failure to acclimatize the Hungarian partridge, some of the eastern states seem to be having remarkable success. The Ohio commission reports that six thousand pair have been distributed over the state, a few pairs going into every county. Reports have been obtained which show that about two thirds of the birds put out mated and nested the first year.

POLITICAL RING CRIPPLES GAME COMMISSION IN MINNESOTA.

The Rinea organization, in control of the last legislature in Minnesota so crippled the Game Commission that only a favorable decision from the Supreme Court or the volunteer service offered by the wardens can save the wild life of Minnesota from the vandals, poachers and pot-hunters. The politicians were successful in preventing the 30,000 dollars license money being used for wardens' pay.

2,075 DEER KILLED IN NEW BRUNSWICK.

The Chief Game Warden of New Brunswick has made his annual report of

the number of deer killed in that province in 1913. The figures are as follows: moose, 1,499; deer, 2,075; caribou, 454; a total of 4,028. These figures are interesting in view of the statement in a history of New Brunswick published in 1827 to the effect that the last moose had vanished from the forests of that province. These figures also show what can be done by proper methods of game protection and the same holds true in regard to forest protection. New Brunswick's revenue from game licenses is more than sufficient to pay its present fire and game protection organization.—Fish and Game Conservationist and Warden's Journal, Hinsdale, Illinois.

THE EUROPEAN WAR AND GAME.

According to an editorial in "Forest and Stream," the European war is even having an effect on game laws. In Western Canada certain people are asking for a relaxation of the game laws on the grounds that game is now needed for food.

ILLINOIS ADOPTS THE REFUGE IDEA.

Illinois is planning to establish game refuges in each of the 102 counties of the state. Four have already been provided. Land is rented for a long period of time and a game warden is posted to kill vermin and prevent hunting.—"Recreation and Outdoor World," August, 1914.

A SHOOTING LICENSE LAW FOR TEXAS.

At the next legislature Texas will endeavor to put through a resident shooting license law. At the third annual convention of the Texas Game and Fish Protective Association this move was recommended. — "Recreation and Outdoor World," August, 1914.

MARYLAND WILL TRY FOR A NO-SALE LAW.

A no-sale bill on partridges (quail) "pheasants" (grouse) and woodcock has been introduced in the Maryland legislature with some hope of success.—"Recreation and Outdoor World," August, 1914.

LIFE HISTORY NOTES.

DUCKS' NEST IN GRAIN FIELDS.

There has been considerable speculation as to the effect of the increased cultivation of land on our breeding ducks. Most people take the view that, as the marshes are reclaimed, there will be fewer and fewer ducks breeding within our state. This is doubtless the truth of the matter but something may also be said on the other side. Certain field crops apparently furnish nesting sites for ducks. A letter from Mr. William N. Dirks, Superintendent of the State Game Farm, states that a number of ducks' nests were found this last spring while the grain was being cut on the ranch of Mr. Herman Hess, near Alvarado, Alameda County, California. The following nests with their complements of eggs were discovered:

May 7—

Spring	11 eggs
Mallard	11 eggs
Cinnamon teal	11 eggs
Cinnamon teal	11 eggs

May 9—

Mallard	14 eggs
Cinnamon teal	11 eggs
Cinnamon teal	2 eggs

May 12—

Cinnamon teal	12 eggs

The eggs which were not broken by the mowing machine were taken to the State Game Farm at Hayward, and from them were hatched thirty-four cinnamon teal, one sprig and five mallard. Some of the eggs were in the incubator only two days and none over ten days.

RING-NECKED PHEASANTS IN ALAMEDA COUNTY.

On April 22, 1914, a man who was cutting grain on a ranch near Agnew discovered a nest of a wild ring-necked pheasant, which contained seventeen eggs. Four eggs were broken by the machine. The others were taken to the game farm, where, after remaining in the incubator for two days, all of the thirteen were successfully hatched.

STILTS PROVE TO BE WISE BIRDS.

Recent investigations in the vicinity of Los Banos have shown that the black-necked stilt, *Himantopus mexicanus*, are able to protect their eggs from the encroachments of rising irrigation water. As a rule these birds build a crude nest of weed stems in a small depression on the ground. However, when the water starts to raise, the birds built up the nest as the water rises and so keep the eggs from harm. Nests have been found built up to a height of seven or eight inches above the ground. In the same vicinity many ducks' nests are destroyed because these birds do not have sense enough to protect themselves as do the stilts.

PREDACEOUS ANIMALS DESTROY DUCKS' NESTS.

During the past summer investigations of the duck breeding grounds near Los Banos showed that predaceous animals were destroying large numbers of ducks' nests. As many as eight raided nests were discovered in a single afternoon. The lowering of water in this vicinity allows animals to approach the nests and destroy them. The eggs were found broken into and the contents had been sucked out. The cinnamon teal, the commonest nester in this vicinity, appeared to suffer the most. Raccoons are common mammals in the vicinity and it is probable that they were the depredators, although the raids may have been due to coyotes.

WILD LIFE IN RELATION TO AGRICULTURE.

WILD GEESE NOT A MENACE TO RICE CROPS.

FISH AND GAME COMMISSION,
San Francisco, Cal.

GENTLEMEN: Replying to your inquiry of March 4th, regarding the alleged damage done by wild geese to growing crops, especially to the new industry of rice farming in northern California, I will say that these reports—so often in evidence about this season—do not come altogether from the farmer or rice grower, but from the market hunters, who, when the time comes for the arrival of the geese on their way from the northern nesting grounds, display a sudden interest in the welfare of the farmer and the rice grower. The amount of damage done to young grain by wild geese depends upon the stage of growth. Should the grain be sufficiently strong to resist the geese and they are unable to pull out the kernel, in that event the geese nip off the tops of the young grain only, which aids or promotes the growth, as the farmer himself says, makes it stool out heavier. However, should the grain be just showing above the ground, the geese may destroy the grain by pulling out and eating the seed. Most of the grain found in the stomachs of geese is eaten in stubble fields after harvest. Every flock of geese that is seen in growing grain is said to be eating such grain, when, as a matter of fact, an examination of the food so eaten will disclose that the geese are feeding upon a noxious grass, the name of which I do not know, except by the name of "goose grass." It has a seed rich in oil and is very fattening, sheep doing exceedingly well upon this feed. It is this feed that gives the strong odor to geese at this time.

As to the injury done in the rice fields—I have never seen a goose in a rice field; have never seen a grain of rice in the stomach of a goose, and I do not think any one else ever has. I invariably observe the contents of the stomachs of all the birds I kill. I have shot in the vicinity of the rice fields in the Gridley and Biggs country ever since rice growing began. I have it on the authority of Mr. E. C. Adams, of Biggs, who is the government rice expert, appointed by the Department of Agriculture, and who lives in the center of the rice fields, that geese never eat rice in any form. He states that he has never seen a wild goose on a rice field at any time. Before the harvest the rice that is eaten by the mallard and sprig ducks is that portion broken down by the hundreds of thousands of blackbirds which infest these localities. After the harvest the ducks eat the grains that have been threshed out and left behind. Ducks and geese can not eat it when growing, because it is unripe and green and very tall. As soon as it ripens the water is drained off. It is then harvested, bundled and cocked up to be threshed. At this time only the ducks eat the grain left on the ground.

You will remember that I investigated many of these complaints last August and September, in and about Biggs, and could not find the duck guilty at that time, simply because the ducks could not eat a long, green, slender head of unripe grain. The ducks were there simply because there was an abundance of water and a plentiful supply of other food, bugs, beetles and water growth of many varieties. I endeavor to run down all the alleged charges of destruction of grain by wild geese whenever possible.

On February 13th I received a communication from an inspector under the United States migratory bird law, to investigate a complaint made by an attorney of Sacramento, who stated that he represented clients whose lands were being damaged by the depredations of wild geese. I addressed a letter to the attorney requesting him to give me the names of his clients, together with the names of the localities where this damage was being done, so that I might personally investi-

[illegible] report intelligently on the actual damage done. He replied to me, saying that the geese were not now doing any damage whatever. He also failed to give the names or localities where this alleged damage was being done.

This is not only my individual opinion, but I am sustained by possibly the greatest practical authority on wild geese today, A. W. Stewart, of Grand Island, who has been a student of their habits for many years in the fields, and, in fact, can almost talk their language.

Respectfully,

GEORGE NEALE,
Assistant Commissioner.

Sacramento, Cal., March 13, 1914.

DEER AND APPLE TREES.

It may be that deer damage apple trees in some places, but the following note can be taken as negative evidence in this regard. Mr. Davis, of Seven Cedars, southwest Trinity County, always hunts at a distance from home, although many deer are to be found on his own place where he has 800 apple trees. He says that he likes to have the deer on his place and so never kills them near home.

REPORTS

SEIZURES, FISH AND GAME.

July 1, 1914, to August 31, 1914.

Fish.

Striped bass	185	pounds
Trout	75½	pounds
Salmon	257	pounds
Steelhead	150	pounds
Miscellaneous fish	209	pounds
Crabs	1,498	

Game.

Deer meat	190	pounds
Deer heads	3	
Ducks	2	
Quail	10	
Hares	4	
Rabbits	1	

SEARCHES.

Illegal fish and game	27

Violations of the Fish and Game Laws, July 1, 1914, to August 31, 1914.

Offense	Number arrests	Convicted	Acquitted and dismissed	Sentence suspended and probation	Pending	Bail forfeited	Fines imposed	Fines paid
Game.								
Hunting without license	31	30	2		1	10	$540 00	$300 00
Deer, close season, killing or possession	12	10	2	1			950 00	170 00
Female deer, killing or possession	6	5	1				275 00	175 00
Rabbits, close season, killing or possession	4	4		1		25	60 00	35 00
Doves, close season, killing or possession	5	5		1			125 00	100 00
Ducks, close season, killing or possession	1	1					25 00	25 00
Quail, close season, killing or possession	8	8					215 00	145 00
Tree squirrels, close season, killing or possession	1	1					25 00	
Night hunting	1				1			
Total game violations	71	64	5	3	2	35	$2,215 00	$1,130 00
Fish.								
Angling without license	5	5					$125 00	$125 00
Fishing for profit without license	4	1		1			40 00	10 00
Wholesale dealing in fish without license	2	2					40 00	40 00
Young of fish, catching or possession	4	1					100 00	100 00
Taking trout, other than with hook and line	1	1		1				
Underweight striped bass, possession and sale	3	3					60 00	60 00
Buying and selling salt water perch	2	1	1				10 00	10 00
Using explosive for killing fish	1	1					250 00	250 00
Shipping excess bag limit of trout, one day	1				1			
Excess bag limit clams, possession, one day	1	1					20 00	20 00
Taking crabs in Eel River other than on Thursdays	2				2			
Undersized crabs, possession	1		1					
Total fish violations	27	22	2	2	3		$645 00	$615 00
Grand total	98	86	7	5	5	35	$2,860 00	$1,745 00

LION BOUNTIES.

Statement of Lion Bounties Paid by Fish and Game Commission from October, 1907, to June 30, 1914.

	1907	1908	1909	1910	1911	1912	1913	January 1 to June 30, 1914	Total
Alameda		1							1
Amador		3		1	2				8
Butte	2	11	5	2	4	3	2	1	30
Calaveras		1	4	1		1		1	8
Colusa		3		4	3	1	1	2	13
Del Norte		10	12	4	11	11	23	4	75
El Dorado	2	7	2	1	8	9	6		35
Fresno		1	3	1		4		1	10
Glenn		13	6	6	1	4	3	1	34
Humboldt	10	113	67	71	47	40	41	24	413
Inyo						1			1
Kern		8	10	12	5	9	10	2	56
Lake	2	14	11	13	8	10	7	2	68
Lassen			1		2	1	2		6
Los Angeles		7	1	2	2		2	1	15
Marin		3	5	1		1	1	9	20
Mariposa	2	4	5	6	4	1	4	3	29
Mendocino	5	41	18	11	16	17	24	11	146
Merced				1					1
Modoc			1	1	1				3
Monterey		14	11	7	1	3	9	3	48
Mono								2	2
Napa				1		2			3
Nevada		1	1	1					3
Orange			1	1	1		1		4
Placer		4	4	1	2	7	3	1	23
Plumas		2		3		1	2		8
Riverside		2	3			4	3		13
San Benito		1	2	1	2	11	3	2	22
San Bernardino		5	2	1	2		2	1	13
San Diego		3	3	5	5	3	1	1	26
San Luis Obispo		11	5	9	4	4	3	6	42
San Mateo				1					1
Santa Barbara		7	24	7	4	5	11	1	58
Santa Clara			4			1	1	1	7
Santa Cruz				1					1
Shasta	1	25	32	31	29	28	22	5	173
Sierra		1				3	2		6
Siskiyou	1	31	31	45	25	25	22	13	197
Solano				4	1	4	1	1	13
Stanislaus			2		1				3
Sutter						1			1
Tehama	3	31	19	25	10	22	27	2	139
Trinity	9	86	34	22	22	15	14	10	222
Tulare		6	5	11	4	5	3	3	40
Tuolumne		6	10	5	2	4	1	1	29
Ventura		1	6	4	6	2		1	20
Yuba		1			2				3
Totals	37	492	361	353	293	273	280	118	2,099

LION BOUNTY CLAIMS.

Applicants for the bounty of twenty dollars ($20.00) paid by the Fish and Game Commission on mountain lions killed in the State of California, are hereby notified that no claim will be considered unless the following requirements are complied with:

Either the *scalp*, or skin with scalp attached, of the mountain lion upon which a bounty is claimed must be sent to the office of the Fish and Game Commission, *San Francisco, all express or mail charges prepaid.* The skin should be either dried, tanned, or otherwise cured before shipment, as green skins spoil quickly, becoming very offensive and losing all value. Offensive green scalps or skins, *or those sent charges collect will not be accepted.*

All hides and scalps received by the Fish and Game Commission will be destroyed unless full directions are given for return to claimant, or for other disposition. A tag with name of claimant, together with shipping directions thereon should be *attached* to hide or scalp. All return shipping charges must be paid by claimant or other person receiving package.

A claim must be made for *each* animal, upon a form provided by the Fish and Game Commission, whereupon must appear the names and addresses of the claimant and *three* witnesses. This claim must be acknowledged before a notary public or justice of the peace, and must bear the county clerk's certification to the genuineness

Mountain Lion treed and shot by E. J. Curran of Sawyer's Bar, Siskiyou County, California, and the four-point buck killed by the Lion

of the justice's signature. If sworn to before a notary public, this will not be required. Affidavits of witnesses are not required.

The claim must be accompanied by an account of the pursuit and killing of the lion, giving in detail the method used, number of deer carcasses left by the animal, and such other facts as may be of assistance in determining the damage done to deer and other game. Claim blanks will be sent on application.

By order of the Board.

FISH AND GAME COMMISSION.

Mills Building, San Francisco.

FINANCIAL REPORT CALIFORNIA FISH AND GAME COMMISSION.

Disbursements July 1, 1913, to June 30, 1914.

GENERAL FISH AND GAME PATROL, ADMINISTRATION, ETC.

San Francisco Division

Salaries of deputies and employees	$37,404 50	
Traveling expenses, rentals, office supplies, etc.	17,096 84	
		$54,501 34

Sacramento Division

Salaries of deputies and employees	$25,834 00	
Traveling expenses, rentals, office supplies, etc.	13,050 14	
		38,884 14

Los Angeles Division

Salaries of deputies and employees	$12,227 00	
Traveling expenses, rentals, office supplies, etc.	4,953 98	
		17,180 98

Fresno Division

Salaries of deputies and employees	$11,746 00	
Traveling expenses, rentals, office supplies, etc.	6,894 85	
		18,640 85

Miscellaneous Expenditures

Traveling expenses—commissioners	$80 02
Prosecutions and allowances	8,486 68
General printing, license lithographing, etc.	6,458 28
Sub-total—fish and game patrol, administration	$145,032 29

Sub-total fish expenditures—40 per cent—$58,012.916.
Sub-total game expenditures—60 per cent—$87,019.375.

FISHERY EXPENDITURES

Superintendent of Hatcheries and Assistants

Salaries	$4,072 50	
Traveling expenses, supplies, etc.	1,009 81	
		$5,082 31

Sisson Hatchery

Salaries	$13,476 23	
Traveling expenses, supplies, etc.	7,881 64	
		21,357 87

Tahoe and Tallac Hatcheries

Salaries	$2,650 17	
Traveling expenses, supplies, etc.	679 73	
		3,329 90

Price Creek Hatchery

Salaries	$1,791 67	
Traveling expenses, supplies, etc.	1,016 53	
		2,808 20

Ukiah Hatchery and Snow Mountain

Salaries	$904 25	
Traveling expenses, supplies, etc.	419 90	
		1,324 15

Waicona Hatchery

Salaries	$487 50	
Traveling expenses, supplies, repairs, etc.	247 70	
		735 20

Klamath Spawning Stations.

Salaries	$2,094 50	
Traveling expenses, supplies, repairs, etc.	1,322 76	
		3,417 26

Brookdale Hatchery

Salaries	$320 00	
Traveling expenses, supplies, repairs, etc.	77 55	
		397 55

Sacramento Experimental Station

Rental	12 00

Screen and Fishway Surveys and Supervision

Salaries	$6,907 33	
Traveling expenses, supplies, etc.	2,032 30	
		9,239 63

Fish Patrol (Launches, etc.)

Salaries	$2,649 00	
Traveling expenses, supplies, repairs, etc.	1,768 91	
		$4,417 91

Fish Distribution (car and messenger)

Salaries	$1,751 02	
Traveling expenses, supplies, repairs, etc.	1,307 87	
		3,058 89

Fish Transplanting (Pack-train, Messenger, etc.)

Traveling expenses, supplies	167 51

Miscellaneous Expenditures

Anglers' license commissions	1,148 30
Market fishing license commissions	532 75
Crawfish inspection	1,100 00
Sub-total fish expenditures	$58,729 43

GAME EXPENDITURES

Hayward Game Farm

Salaries	$2,698 50	
Traveling expenses, repairs, supplies, etc.	3,978 86	
		6,677 36

Miscellaneous Expenditures

Hunting license commissions and refunds	14,680 70
Mountain lion bounties	4,100 00
Sub-total game expenditures	$25,458 06

Fish and Game Research and Publicity

Salaries	$600 00	
Traveling expenses, supplies, etc.	491 04	
		$1,091 04

Sub-total fish expenditures (40 per cent)	$436,416.00
Sub-total game expenditures (60 per cent)	654,624.00
Total expenditures	$230,310 82

RECAPITULATION.

Total fish expenditures	$117,178.762
Total game expenditures	113,132.058
Grand total all expenditures	$230,310.820

STATEMENT OF EXPENDITURES FOR THE MONTH OF JULY, 1914.

GENERAL ADMINISTRATION

Commissioners' traveling and other expenses	$50 75	
Salaries of administrative assistants	975 00	
Traveling expenses of administrative assistants	38 27	
Rentals, office and other supplies	381 30	
		$1,445 30

GENERAL FISH AND GAME PATROL

San Francisco Division

Salaries of deputies and employees	$2,557 50	
Traveling expenses of deputies and employees	1,467 78	
Rentals, office and other supplies	230 63	
		4,255 91

Sacramento Division

Salaries of deputies and employees	$2,207 00	
Traveling expenses of deputies and employees	1,625 92	
Rentals, office and other supplies	103 63	
		3,936 55

Los Angeles Division

Salaries of deputies and employees	$1,190 00	
Traveling expenses of deputies and employees	460 21	
Rentals, office and other supplies	144 99	
		1,795 20

Fresno Division

Salaries of deputies and employees	$973 00	
Traveling expenses of deputies and employees	467 55	
Rentals, office and other supplies	77 47	
		$1,518 02

Miscellaneous Expenditures

Prosecutions and allowances		306 70
General printing		23 07
Total, general administration and patrol		$13,280 84
Payable cost general administration and game patrol (60 per cent)		$7,968.504
Payable cost general administration and fish patrol (40 per cent)		5,312.336
		$13,280.840

FISHERY EXPENDITURES

Administration

Salaries of superintendent of hatcheries and assistants	$427 50	
Traveling expenses, superintendent hatcheries and assistant	19 75	
Office and laboratory supplies, etc.	17 50	
		8524 84

Fisheries Research and Publicity

Salaries	$145 00	
Traveling expenses	77 55	
Supplies, etc.		
		222 55

Screen and Fishway Service

Salaries	$500 00	
Traveling expenses	218 70	
Supplies	13 94	
		732 64

Fish Transplanting (Pack-train, Messengers, etc.)

Salaries	$300 00	
Traveling expenses	1,292 94	
Repairs and supplies	19 55	
		1,621 49

Fish Distribution (Car and Messengers)

Salaries	$310 00	
Mess allowance and traveling expenses	186 00	
Repairs	596 13	
Supplies	121 68	
		1,213 81

Fish Patrol (Launches, etc.)

Salaries	$220 00	
Mess allowance and traveling expenses	46 80	
Repairs		
Supplies (oil, etc.)	100 79	
		385 59

Sisson Hatchery

Salaries	$1,002 75	
Traveling expenses		
Construction and repairs	20 55	
Fish food and ice for mm:	606 27	
General supplies	225 61	
		1,945 18

Tahoe and Tallac Hatcheries

Salaries	$415 00	
Traveling expenses	67 65	
Construction and repairs	1 22	
Supplies	139 01	
		625 88

Ukiah Hatchery and Snow Mountain

Salaries	$282 50	
Traveling expenses		
Construction and repairs	75	
Supplies	52 60	
		335 85

Wawona Hatchery

Salaries	$120 00	
Traveling expenses	30 00	
Construction and repairs		
Supplies		
		150 00

Miscellaneous Expenditures.

Printing and lithographing of fishing licenses, tables, application blanks, etc.	$82 81
Anglers' license commissions and refunds	914 05
Market fishing license commissions	30 00
Crawfish inspectors	100 00
Total fishery expenditures	$8,807 29

GAME EXPENDITURES.

Haugard Game Farm

Salaries	$207 50	
Traveling expenses	62 60	
Rent		
Construction and repairs		
Feed for birds	1 00	
General supplies	49 38	
		$320 48

Game Research and Publicity.

Salaries		
Traveling expenses		
Supplies, etc.	$10 80	
		10 80

Miscellaneous Expenditures.

Printing and lithographing of hunting licenses, tables, application blanks, etc.	
Hunting license commissions and refunds	378 40
Mountain lion bounties	220 00
Total game expenditures	$1,129 68
Grand total of all expenditures	$23,396 81

RECAPITULATION.

Total of fish expenditures	$14,296 03
Total of game expenditures	9,068 78
Grand total	$23,396 81

STATEMENT OF EXPENDITURES FOR THE MONTH OF JULY, 1914.

Salaries, traveling expenses, rentals, supplies, etc.	
County administration	$1,145 30
San Francisco District	4,255 91
Sacramento District	3,096 55
Los Angeles District	1,795 20
Fresno District	1,518 02
Salaries, traveling expenses, supplies, etc.	
Hatchery administration	321 81
Fishery research and patrol	240 53
Screen and fishway service, etc.	332 61
Fish transplanting	1,021 10
Fish distribution car	1,212 81
Fish patrol launches	787 20
Sisson hatchery	1,945 17
Tahoe and Tallac hatcheries	625 55
Pyramid Creek hatchery	
Lobdell and Shasta Mountain	335 85
Wawona hatchery	150 00
Klamath spawning stations	
Game farm	320 48
Game research and publicity	10 80
Prosecutions and other cases	206 70
Hunting license commissions and refunds	378 40
Anglers' license commissions and refunds	944 05
Market fishing commissions	30 00
Crawfish inspection	100 00
Mountain lion bounties	220 00
Printing and lithographing	105 88
Total expenditures	$23,396 81

BALANCES, AUGUST 1, 1914.

In State Treasury—		
Fish and Game Preservation Fund	$24,687 24	
Support and Maintenance Hatcheries Fund	20,399 06	
		$45,086 30
In Bank—		
Fish and Game Preservation Fund	$7,411 00	
Support and Maintenance Hatcheries Fund	5,240 00	
		12,651 00
		$57,737 30
Less July, 1914, bills		21,303 81
Balance		$34,433 49

STATEMENT OF EXPENDITURES FOR THE MONTH OF AUGUST, 1914.

Salaries, traveling expenses, rentals, supplies, etc.	
General administration	$1,451 00
San Francisco District	4,238 51
Sacramento District	3,497 08
Los Angeles District	1,687 44
Fresno District	1,172 32
Hatchery administration	374 50
Fishery research and publicity	306 85
Screen and ladder surveys	681 78
Fish transplanting	1,775 68
Fish distribution car	749 14
Fish patrol launches	265 29
Sisson hatchery	2,147 63
Tahoe and Tallac hatcheries	336 07
Price Creek hatchery	
Ukiah hatchery and Snow Mountain	1 00
Wawona hatchery	
Klamath spawning stations	
Game Farm	426 56
Game research and publicity	
Prosecutions and allowances	181 62
Hunting license commissions and refunds	235 80
Anglers' license commissions and refunds	407 00
Market fishing commissions	11 25
Crawfish inspection	100 00
Mountain lion bounties	80 00
Printing and lithographing	136 02
Total expenditures	$20,262 54

BALANCES, SEPTEMBER 1, 1914.

In State Treasury—		
Fish and Game Preservation Fund	$28,501 65	
Support and Maintenance Hatcheries Fund	15,701 19	
		$44,202 84
In Bank—		
Fish and Game Preservation Fund	$11,400 00	
Support and Maintenance Hatcheries Fund	6,770 00	
		18,170 00
		$62,372 84
Less August bills		20,262 54
Balance		$42,110 30

PATROL SERVICE.

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Ernest Schmidt, Executive Secretary. J. S. Hunter, Assistant Secretary.
Head Office, 734 Mills Building, San Francisco.

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Earl P. Barnes	Eureka	Otto Lencioni	Healdsburg
Thos. M. Beeson	Fortuna	R. H. Miller	Ukiah
Edward Bosle	San Francisco	W. J. Moore	Napa
J. L. Bundock	Oakland	P. H. Over	Pacific Grove
M. S. Clark	San Francisco	Chas. R. Perkins	Fort Bragg
M. L. Cline	San Francisco	Frank Snook	Salinas
Carl Dewning	Pleasanton	Paul Smith	Ripon
I. L. Kayser	San Jose	Vernon D. Thomas	San Rafael
A. M. Fairfield	San Francisco	H. H. Nickerson	
H. E. Foster	San Francisco		Launch "Quinnat," Vallejo
R. H. Hancock	Suisbright	J. Christensen	
J. H. Hill	Watsonville		Launch "Quinnat," Vallejo

SACRAMENTO DIVISION.

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Forum Building, Sacramento.

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C. H. Diemer	Sacramento	Chas. A. Scroggs	Locke
Frank P. Cady	Susanville	R. L. Stokey	Woodland
S. J. Carpenter	Maxwell	Richard Squire	Lodi
Emil Gyar	Shingle	Jas. S. White	Redding
W. J. Green	Sacramento	P. D. Ricketts	Live Oak
J. W. Harris	Greenview	Frank S. Parks	Sutter Creek
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E. L. N. Ellis	Fresno	Geo. F. Grant	Coalinga
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J. H. Gayer	Elsinore	A. J. Stead	Monte Lado
E. H. Otis	Big Pine		

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

CONTENTS.

		Page
INTRODUCED GAME IN NEW ZEALAND	*J. S. Hunter*	41
AN OBJECT LESSON IN GAME CONSERVATION	*Henry Chase*	44
THE WOOD DUCK IN CALIFORNIA	*Joseph Grinnell and Harold C. Bryant*	49
A CALIFORNIA INDIAN HUNTING LEGEND	*A. L. Kroeber*	52
THE NEW ANGLER'S LICENSE	*Ernest Schaeffle*	59
THE CATFISH IN CALIFORNIA	*George Neale*	62
EDITORIAL		65
HATCHERY AND FISHERY NOTES		69
CONSERVATION IN OTHER STATES		74
LIFE HISTORY NOTES		76
WILD LIFE IN RELATION TO AGRICULTURE		78
REPORTS—		
Violations of the Fish and Game Laws		80
Seizures and Searches		81
Financial Report		82

INTRODUCED GAME IN NEW ZEALAND.

By J. S. Hunter, Assistant Secretary, California Fish and Game Commission.

While we in America have been busy during the past few decades killing off the game, which by nature we were so abundantly endowed, the farsighted people of New Zealand have been busy introducing into their southern islands game animals and are now enjoying the fruit of their farsightedness.

In California, we have driven to practical extermination several species of the elk and antelope, at one time so common that their flesh was of little value. Our deer have also become greatly reduced, but on account of their range being more extended and their inhabiting country densely covered with brush, they have held out far better than the elk and antelope.

New Zealand is extremely deficient in native land animals, two species of bats comprising the entire list.

In 1862, there were secured by certain citizens of New Zealand a number of red deer from the British Isles. Three reached Wellington alive. Several months later these were liberated in the Wairarapa. They had increased to such an extent by 1887 that permits were granted for the killing of a limited number. At the present time, it is estimated that there are fully 10,000 in that section. From time to time, new

blood has been introduced, and it is probable that on this account they have not suffered from inbreeding, but it can practically be said that the vast herd are the descendants of the original three animals.

Another plant of red deer was made in northern Otago in 1870 when seven were liberated. In that section they have increased so that there are now many thousands. Another herd, known as the Nelson herd, was liberated in the early sixties and has likewise increased to a wonderful extent.

Red deer can be found in many different sections of the islands and excellent shooting can be obtained in almost any part. It is estimated that there are in excess of 40,000 now in the islands.

Fallow deer have also been introdueed and are now hunted extensively in many sections. Several other varieties of big game have been introduced. The Ceylon deer, white and blacktailed deer, moose, the Caucasian mountain goat, the chamois, and our most noble of all deer, the wapati or American elk—all of these species are reported to be increasing and will eventually be abundant enough to warrant open seasons.

FIG. 9.—Rainbow trout (*Salmo iridcus*). Tons of rainbow trout are now caught in New Zealand during each open season. They were introduced into the islands in 1881.

New Zealand's efforts in acclimatization have not been confined to game alone. California rainbow trout were introduced in the early eighties. The credit for the first plantings belongs to Mr. Hugh Craig, a former New Zealander, but not a resident of San Francisco. In 1881, while living in San Francisco, Mr. Craig was acting as the corresponding secretary for the Auckland Acclimatization Society. It occurred to him that our native trout should do well in the New Zealand streams. Arrangements were made with Col. A. V. La Motte, who was then with the United States Bureau of Fisheries, and now with the California Commission, to secure 10,000 eggs. These eggs were divided into two shipments. Of the first shipment, very few hatched, and what few did, died within a few hours. When the second shipment was received, no mistakes were made and all of the eggs hatched. The fry were liberated in the Waitakere, a stream a few miles from Auckland. Mr. Craig paid for all the expenses of these shipments out of his private funds. Two years later, the attention of the Hon. Thos. Russell was called to the shipments of trout and he authorized Mr. Craig to pay not exceeding $1,000 in further shipments. Arrangements were then made for shipments of rainbow, Tahoe and Dolly Varden trout and salmon. No

reports have been received by Mr. Craig of these; but the native California trout have succeeded beyond their most sanguine expectations. Trout are now found throughout all of the streams of the northern islands and have been introduced from these streams into the streams of the southern island. In a lake known as Roto Rue, a short distance from Auckland, during the open season, an average of more than four tons a day is taken and on certain days when fishing is heavy, as many as fourteen tons have been caught. Many weighing over forty pounds are frequently taken. Dr. David Starr Jordan remarked at one time that so many fish were taken from this lake that the surface of the water was very much lowered.

The earliest plant of fish in which Mr. Craig took part was a shipment of catfish in 1876. Mr. D. J. Stabler, director of the California

Fig. 18.—Marble Mountain in western Siskiyou County; a great game country.

Sportsmen Society, suggested that he send to his New Zealand people a shipment of catfish. With the assistance of Mr. R. R. Redington, a very prominent sportsman of the early days, two cans of catfish were taken near Stockton and were shipped to the islands. Only five reached New Zealand alive and were liberated in St. Johns Lake, five miles from Auckland. A later shipment of smaller fish, 250 in number, were planted in the same lake. These shipments created considerable comment and unfavorable criticism. One member of the Acclimatization Society cabled, at an expense of $5.60 per word, requesting that no more catfish be sent as they did not want them. Four or five years later, a boy was fishing with a rod and caught a six-pound catfish. He became frightened when he saw the ferocious looking head of the catfish coming out of the water and dropped his rod and ran, but later returned and

took the fish home and it was eaten. That was the beginning of catfishing in the islands. Now, in that section, catfish are taken in great numbers and are greatly enjoyed.

While Mr. Craig was acting as secretary, numerous shipments of our native deer, valley and mountain quail, bobwhite quail and other species of game birds were sent to the islands, and now in the sections where liberated, they can be found in large numbers.

We are indebted to Mr. Hugh Craig of San Francisco and to Mr. Ben Wilson, General Manager of Department of Tourists and Health Resorts at Wellington, New Zealand, for the information so kindly furnished.

AN OBJECT LESSON IN GAME CONSERVATION.*

By Henry Chase, Author of "Game Protection and Propagation in America."

The history of the deer of Vermont is, indeed, an interesting and absorbing subject. It is not only of interest locally to the people of that state, and absorbing to those who are striving for the conservation of our wild life, but it is both interesting and absorbing to the people of this nation. Particularly is this latter statement true as to the American sportsmen. It furnishes an object lesson in game conservation to every state in the union, for the bare statement of the true facts and figures cannot be gainsaid as a real demonstration, and what Vermont has accomplished for its deer any other state may do for its local game by intelligent and positive action. Above all it conclusively proves that the game of a state may be preserved and increased by wholesome protective laws which are properly enforced.

Before proceeding with our narrative of facts, however, it is important to recall and constantly bear in mind that Vermont, with a total area of 9,565 square miles, is among the smallest states of the union—only New Hampshire, Massachusetts, Rhode Island, Connecticut, New Jersey and Delaware being smaller—and yet in 1900 over 600 deer were killed in each of its counties of Windsor, Washington and Rutland, the county of Windsor alone reporting 870 deer lawfully taken during the open season. The same year the great state of Pennsylvania, with a total area of 45,215 square miles, or about five times as large and with equally good deer territory within its borders, reported to Dr. Palmer of the U. S. Biological Survey, that only about 500 deer had been taken in the entire state.

When the hardy New England pioneers from Connecticut and New Hampshire first arrived in Vermont about the middle of the eighteenth century they found the ancient Green Mountains, which form the backbone of the state, filled with game of every description, and the clear, sparkling waters therein teeming with speckled brook trout and other varieties of food fish. So plentiful, in fact, were the game and fish that they furnished the principal articles of diet on the tables of the early settlers, while the pelts of the numerous fur-bearing animals supplied them with warm clothing with which to withstand the long

*Reprinted from Forest and Stream, by permission.

and rigorous winters. Prof. Samuel Williams, in his Natural and Civil History of Vermont, prepared by him in 1807 and which is considered an authority on this subject, says: "The deer is one of our most common animals. * * * The deer are numerous in Vermont and on account of their flesh and skin are of much value." (Page 102, *id.*)

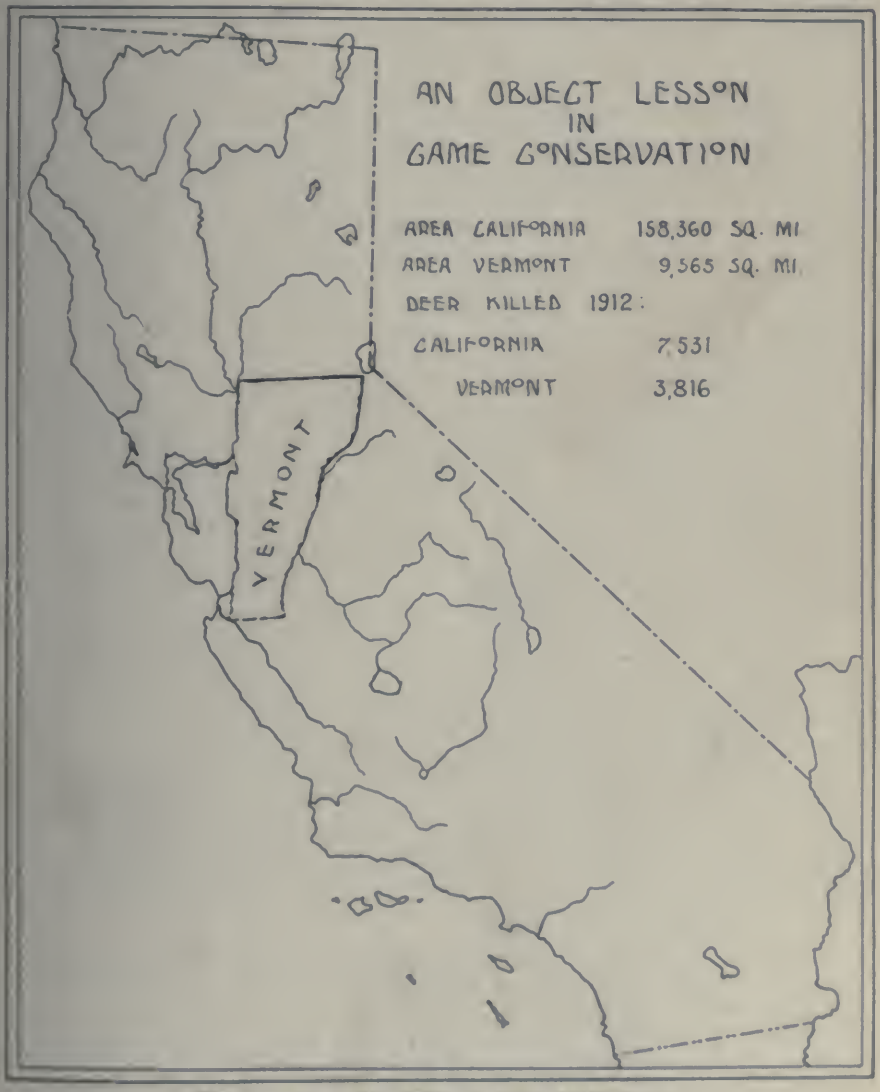

FIG. 11.—An object lesson in game conservation.

"Our forests afford shelter and nourishment for the moose, bear, wolf, deer, fox, wildcat, raccoon, porcupine, woodchuck, skunk, marten, hare, rabbit, weasel, ermine, squirrel, mole and mouse. In our rivers, ponds and lakes the beaver, muskrat, mink and otter are found in large numbers." (Page 98, *id.*) It seems that the people of this state never made any consistent effort to protect any of this game in the early days,

except the deer alone. In 1842 Thompson's famous history of Vermont was published, and it is significant to note what the author of that work says regarding the deer of his time. He says: "When the country was new this deer (the Virginia, or whitetail deer) was one of the most common and valuable quadrupeds found in our forests, and upon its flesh were the first settlers of the state, to a very considerable extent, dependent for food. Indeed, so eagerly was it hunted, and still so anxious were the people for its preservation, that a law for its protection from the 10th of December to the 10th of June was one of the earliest acts of our legislature. But notwithstanding all that has been done for their preservation, their numbers have been constantly diminishing within the state, till they have become exceedingly scarce, except in a few of the most unsettled and woody sections." (Part 1, chap. 2, p. 51.) At present we would be inclined to think our ancestors were using poor judgment in not prescribing a close season permanently at that time and thus save the remnant of their deer supply. But they did not do so and the natural consequences, with which we are now so familiar, followed as a matter of course and the deer were practically exterminated.

But to go back for a moment. The constant pursuit of these animals in those early days with flintlock rifle, crude trap and fishing rod soon converted these people into a hardy, resourceful race of skilled marksmen and brave people. From the standpoint of the sociologist their chief characteristics were their independence and inherent love of liberty, which they prized above everything except life itself. Their habit of wandering afar in pursuit of their quarry, without let or hindrance, and unrestrained by local custom or law, naturally tended to develop this spirit of independence and liberty to its utmost.

From all we are able to gather at present day, while we know the deer were plentiful in those early times, yet they were never so numerous in the history of the state as they were in 1909. This is significant in itself. Excepting an act passed in 1812 to protect the muskrat of the state, no protective measures were enacted but the one above mentioned by Prof. Thompson, passed in 1797, providing for a six months' close season for deer. In the mean time the people of the state placed in their first constitution, adopted in 1777, a provision to secure and safeguard their rights of free hunting and fishing—the liberty to hunt on all uninclosed land and to fish in all boatable waters. That provision still continues a part of the constitution of Vermont. (See section 40, chapter II, Constitution of Vermont.)

Now, it seems that the above constitutional rights of the people were deemed by them so sacred and valuable that for many years after the adoption of this provision it was a bold legislator who dared to propose any sort of measure to protect the game. The result was the inhabitants of the state were left unrestrained by law for many years to hunt and fish when, where and howsoever they pleased, and gradually, but surely, the deer were almost wholly exterminated. In some parts of the state a few escaped the hunters and survived, but over far the greater part were completely wiped out. This condition continued for many years. The first collected and revised edition of the statutes of the state was authorized by the legislature of 1837 and is known as the "Revised Statutes." It contained one chapter, number 90, on the "preservation

of game and the destruction of noxious animals." Section 1 of this chapter made it an offense, punishable by a fine of $10 to kill "any wild buck or doe, fawn or any other kind of deer, between the tenth of January and the first day of the following July." The remainder of the chapter consisted of provisions offering bounties on wolves, panthers, bears and foxes. Until during the late seventies the above included about all the game laws that existed in Vermont. In 1876 the first real step was taken toward rehabilitating the deer. In that year the legislature provided for a close season on deer until September 1, 1880.

This act caused an agitation among the sportsmen of the state to consider ways and means of reestablishing the deer in their former haunts, and some worthy men in the southern counties immediately took decisive action. But what did they do? What was that action? Did they plan a private shooting preserve for their own profit and enjoyment? Not they. No such idea ever entered their minds. They were true sportsmen and good citizens, seeking only to benefit their brethren and promote the best interests of their commonwealth. Hence, their names deserve to go down in the history of sportsmanship as real brothers of the great outdoor guild. They were Dr. Middleton Goldsmith, Martin G. Evarts, Wm. Y. W. Ripley, James C. Dunn, Wallace C. Clement, Percival W. Clement, Waldo P. Clement, Edward H. Ripley, Frederick Chaffee, Samuel E. Burnham, Henry W. Cheney, Dr. A. Kilburn, Levi G. Kingsley, Walter C. Landon, Henry A. Sawyer, Redfield Proctor and Albert F. Davis, all of Rutland; Mason S. Colburn and Charles F. Orvis of Manchester, and ex-Governor Fairbanks of St. Johnsbury.

"Prior to 1878," says ex-Game Commissioner Thomas in one of his biennial reports, "to see a deer in Vermont was certainly a rarity, and if one was seen it was of so much importance it was published by the press throughout the state." This gives an idea of how scarce the deer were at that time. During the above year these sportsmen raised a fund among themselves with which they procured 17 deer. Ten were purchased from the keeper of the state's prison at Dannemora, New York, and the others secured elsewhere by purchase and gift. In the months of April and May these deer were liberated in the Green Mountain forests of Rutland and Bennington counties.

Well these sportsmen knew, however, that only half of the problem had been thus solved. Care, watchfulness and protective legislation were necessary to afford these deer an opportunity to establish themselves in their new homes, so the solicitude of the donors never abated until they had obtained a close season which continued for 19 years. During this time public sentiment was aroused in favor of protective measures, a penalty of $100 fine was exacted from any one who killed one of these animals and all of the leading sportsmen of the state made it their individual duty and obligation to see that this law was enforced rigidly. The result, as the figures will show, seems astonishing to the uninitiated.

In 1897 an open season was declared for the entire month of October. Only bucks were allowed to be taken, but each hunter was permitted to kill two deer. No serious attempt was made by the game officials to secure statistics for that season, but it was apparent to all that this law did not furnish an adequate measure of protection, so at the next session of the legislature in 1898 the open season was changed to the last 10

days of October and only one buck was allowed to each hunter. These provisions continued until 1905, when the legislature of the previous year had changed them to the last week in October containing 6 working days, Sunday excepted, and this open season of 6 days was in force until 1911. In 1908, however, the deer had become so numerous in the state that a persistent demand was made on the lawmakers to permit the killing of does as well as bucks. The demand came principally from the farmers who complained that the deer were destroying their crops, so the measure was approved and allowed for two consecutive years—1909 and 1910. The legislature of the latter year, however, changed the open season to allow the killing of bucks only from November 15 to November 25, both dates inclusive, but this act did not become effective until 1911. During the session of 1912 the open season was again changed for bucks only from November 10 to December 1, both dates inclusive.

Now, let us see what the figures show for this period. The old saying is "that figures don't lie," and in this case they speak volumes. The early figures are undoubtedly too small, but subsequent to 1902 they are conservatively accurate. In 1906 a statute was enacted requiring each hunter who killed a deer during the open season to report the fact to the nearest warden and exhibit to the latter the head of such deer. For the years 1898, 1899, 1900 and 1901, 555 deer were reported killed; for 1902 and 1903, 1,513; 1904 and 1905, 1,322; 1906 and 1907, 2,234; 1908 and 1909, 7,519; 1910 and 1911, 6,787; 1912 and 1913, 3,816 deer. This makes a total for the period when open seasons have been permitted since the sportsmen above named liberated 17 deer in 1878 of 23,746 deer, or in round numbers about 25,000. Unquestionably, this estimate is conservatively low, for it is impossible to keep track of every deer that is lost to a state. Estimating that each deer possesses an average market value of $10, here was an asset to Vermont of one quarter of a million dollars.

Not only was the state practically overrun with deer in 1908–09 and 1910, but the overflow drifted extensively into the states of New Hampshire on the east, New York on the west, and Massachusetts on the south—the latter state being particularly fortunate in this respect, its counties of Berkshire and Franklin being well stocked from Vermont deer.

Here, then, is certainly an object lesson to other states, and warning to Vermont itself not to again become careless and indifferent regarding this valuable state asset. And in that respect it is alarming to note the falling off in the figures of the last two years and at the same time extending the open season. The tide is turning and Vermont should not permit such a long open season at this time.

The specific lessons we learn from this history with respect to game legislation are these:

1. Only full grown bucks should be permitted to be taken in the open season. In order to accomplish this, and at the same time protect human life, the law should provide that only deer with horns a certain specified length may be killed.

2. Not more than one such deer as above should be allowed to each hunter. The time for wholesale slaughter of deer is past, and at present only short open seasons can be permitted if the deer supply is to be

conserved. In such cases who but a game-hog or mercenary butcher wants more than one deer?

3. Require by law that each person killing a deer shall report that fact to some designated official or game officer. This is absolutely essential in order that the game department may recommend proper legislation affecting deer.

4. Make the open season comparatively short and base the length of same on the official figures as above obtained. If such figures show a steady increase the season may be lengthened with safety; if a falling off, then it should be shortened.

THE WOOD DUCK IN CALIFORNIA.

By Joseph Grinnell and Harold C. Bryant.

(Contribution from the Museum of Vertebrate Zoology of the University of California.)

It is universally accepted that the wood duck (*Aix sponsa*) is the handsomest of all the ducks of the United States. Its near relative, the mandarin duck of Asia, is its only near competitor for honors, and so far as brilliancy of coloration is concerned even this species may be given second place. The wood duck's habit of making special display of its bright colors but adds to its ever evident beauty and grace when on the water.

In California the wood duck was formerly well distributed throughout the low country west of the Sierras. Now it is a rare local resident of the Sacramento and San Joaquin valleys and westward to the coast, frequenting the timber-bordered streams and freshwater sloughs, especially in the oak belt. Although permanently resident within the state, the species appears to a slight extent migratory toward the north in April and to the south in October. It is rare in southern California where as a rule favorable conditions are lacking. The southernmost record is Ramona, San Diego County.

So conspicuous and distinctive is this duck that field marks are hardly necessary even for the uninitiated. The crested head crossed by white stripes, the pure white under parts and the bright metallic colors always betray the male. Although lacking the bright coloration of the male, the female displays much more color than the females of other species and in addition can be recognized by a white eyering which extends back of the eye as a white streak.

Wood ducks seldom stray away from the secluded, wooded streams and sloughs which constitute their habitat. "A mossy log in a pond is a favorite resting place for the ducks, but as you walk through the woods in spring a pair will often fly from a branch overhead, uttering their shrill, plaintive cry as they dart through the trees." (Bailey, Handbook of Birds of the Western United States; Houghton, Mifflin Co., N. Y., 1902, pp. 55-56.)

The wood duck is to be ranked among the early nesters. Most ducks nest on the ground, but this species selects hollows in trees which may be either living or dead. Often the nest is built above the water, but sometimes at a considerable distance from it. Occasionally the entrance to the nesting cavity is forty or fifty feet above the ground. The nest is sometimes placed several feet below the entrance to the hollow. Twigs,

grass and leaves are used as building materials and the lining is of down. A deserted woodpecker's nest enlarged through decay is ofttimes used. The hollow end of a broken-off branch is said to be frequently selected. Sampson (Condor, 3, 1901, p. 95) found a wood duck's nest located in a deserted home of the red-shafted flicker, about twenty-five feet above the ground in a white oak tree, at Forest Lake, San Joaquin County, April 29, 1900. The nest contained twenty-one eggs. As a difference in size and coloration was noticeable in the eggs, it is probable that the nest had been occupied by two females.

Messrs. R. S. Wheeler and W. B. Sampson found a set of fifteen eggs of this species in 1896 at a point on the San Joaquin River a short distance above Lathrop, San Joaquin County. The nest was in a hollow tree close to the overflow from the river, and the tree was infested with ants, which, however, did not appear to have in any degree disturbed the ducks. Wheeler has also reported the nesting of a pair of wood ducks in a barn on the Sacramento River, near Isleton, Sacramento County. The birds entered the barn through a hole in the boards and built their nest in the hay. The farmer who owned the hay guarded the nest and allowed the eggs to hatch.

Mr. Joseph Mailliard tells us of having found in 1872 or 1873 a nest of the wood duck in a hole in a dead tree on the bank of Gallinas Creek, Marin County. One of the parents was frightened from the nesting cavity. The nest contained not less than eight eggs, though no accurate record was kept of the circumstances.

This duck returns to the same nesting site year after year. Incubation lasts for a period of four weeks; the female alone attends to this duty, the male usually being found standing guard on a nearby limb. Some observers say that the male deserts the female during this period. The young either tumble out of the nest and are led to water, or, as several observers have asserted, are carried to the water one by one in the bill of the mother. The call of the young is said to be a mellow *pee-pee-pee*.

"The wood duck is conspicuous for the swiftness, ease and elegance of its flight. It can pass through woods, and among the branches of trees, with as much facility as the wild pigeon. While flying it is rarely ever heard to utter any cry." (Baird, Brewer and Ridgway, North American Birds; Little, Brown & Company, N. Y., 1884, p. 14.) This species is to be found in pairs or at most in small flocks.

The wood duck does not limit itself to the aquatic insects and plants found along the stream near its regular abode, but often forages about the woods in search of other food. Belding (MS) says that on the Feather River it feeds in corn and wheat fields after harvest and also on wild grapes and acorns.

Joseph Mailliard saw quite a number feeding on acorns at Paicines, San Benito County, October 13, 1900. The stomach of a female taken near Laytonville, Mendocino County, in November, 1913, contained a large number of acorns. A female taken near Santa Rosa contained sprouting acorns. Acorns would appear, therefore, to form a very general article of diet. Stomachs of the eastern wood duck examined by the United States Biological Survey (McAtee, U. S. Dept. Agric., Bureau Biological Survey, Circ. 81, 1911, p. 1) show that over fifteen per cent of the food is made up of wild rice and celery and over six per cent of pond weeds. A stomach examined by the writers obtained

in Sutter County contained twelve back swimmers (Notonectidæ) and a quantity of sand.

At the present time the wood duck exists wild in such small numbers that it should not properly be considered a game bird of the state. Nevertheless, its flesh is declared to be delicious; and since it has proven itself readily domesticated there seems no good reason why it cannot be raised in captivity as a commercial proposition and sold on the market. At present there is a brisk demand from breeders and pleasure parks for this, the handsomest of the duck tribe.

Early writers report the wood duck as common in California. Townsend (Proc. U. S. Nat. Mus., 10, 1887, p. 194) says that it was observed on the lower McCloud River at various times from October 1 until March 1, often in quite large companies, and was seen in April and May at Red Bluff, where it frequented the sloughs in the timber belts along the Sacramento River. Heermann (Pac. R. R. Rep., 10, 1859, p. 68) gives it as "Abundant, breeding in the hollow trees bordering the streams of California." Mailliard (Condor, 13, 1911, p. 49) says: "As late as twenty-five years ago it was no uncommon thing to see wood ducks scattered in small groups along such a stream as the Paper Mill or Lagunitas Creek, in Marin County, or anywhere along the Santa Rosa Laguna in Sonoma County, even where quite a number of people lived in the vicinity and where there was a good deal of travel along the streams. Often the ducks were found in small tributaries and diminutive ponds along these waterways." The last one killed in this vicinity was taken on October 23, 1898. Mr. A. Jackson reports that a limit of wood ducks could be obtained along the Napa River fifteen years ago. Although he has recently hunted in the same locality, not a single wood duck is now to be seen there. Streator (Ornithologist and Oologist, 11, 1886, p. 90) records the species as rare near Santa Barbara, but says that birds were occasionally met with beyond the Santa Inez Mountains about ten miles from that city.

Practically none are to be found in these old haunts at the present time. An individual is occasionally reported as being seen in the locality above mentioned by Mailliard and in the vicinity of Gridley, Butte County; but further than this and an occasional one reported by a collector or market hunter, the species is now almost unknown. Dr. W. F. Badé reports that he saw numbers of wood ducks on the Sacramento River on a trip from Tehama to Chico in 1905. When the same trip was taken in 1911 not more than six were seen. The more recent records of its occurrence are as follows: Ramona, San Diego County, November, 1905 (Sharp); Redlands, San Bernardino County, October 2, 1909 (Willett); Banning, Riverside County, April, 1907 (Willett); Stanislaus County, fall of 1910 (Mailliard); Oxnard, Ventura County, November 6, 1905 (Grinnell); Reedley, Fresno County, April, 1910 (Tyler); near Laytonville, Mendocino County, November, 1913 (F. C. Clarke). Mr. J. S. Hunter, Assistant, State Fish and Game Commission, has stated to us that whereas this species came to the market in considerable numbers several years ago, not more than two or three have been seen during the past few years. Wood ducks to the number of 440 are recorded as sold in the markets of San Francisco and Los Angeles in the season of 1895-1896. The records of sale in the markets of San Francisco during the season of 1910-1911 show a total of six birds.

From the foregoing evidence it can be seen that the wood duck, although existing in California in considerable numbers in the early days, is now nearly extinct. A number of the eastern states have found it necessary to give it complete and permanent protection in order to save it. California's only hope of saving this species is to do likewise. Although the wood duck is migratory in most states, it remains with us throughout the year and so gives us added responsibility. The federal regulations regarding migratory birds, which went into effect in the fall of 1913, placed a close season of five years on the wood duck. At the end of this period renewal of total protection will doubtless be necessary.

Berkeley, July 3, 1914.

A CALIFORNIA INDIAN HUNTING LEGEND.

By A. L. Kroeber, Assistant Professor of Anthropology, University of California.

The myths and legends of the American aborigines are in great measure explanations of nature and their own customs. One story will set forth why the sun rises daily in the east and pursues his path across the heavens; another, why the stars twinkle at night, or the raccoon has a ringed tail; while a large class of traditions, related with particular ardor by the old men, are intended to instruct subsequent generations in the origin of this or that dance, ceremony, or habit of native life.

Hunting and fishing play so large a part in the existence of nearly all Indian tribes that one might expect to find innumerable stories explaining the beginning of these occupations. As a matter of fact, the reverse is true. The customs were so fundamental to the various tribes that they rather took them for granted as being something normal. Literally, thousands of legends could be cited in which the characters are depicted as engaged in hunting for their daily subsistence; but this arrangement seems so obvious to the aboriginal mind, that traditions containing a definite explanation of how human beings learned or came to hunt, are exceedingly rare. The following tale, which is one of the exceptions to this rule, may therefore be of interest, particularly as it hails from one of the few California tribes still preserving something of the ancient habits of life. They are the Karok Indians living along the Klamath River in Humboldt and Siskiyou counties, above and below the mouth of the tributary known as the Salmon River.

The tradition is typically Indian in that practically all of the characters mentioned in it are animals. These, however, speak and act very much like human beings. The universal Indian theory of the world is, that there was a period before the human race was in existence, when the earth was peopled only by spirits and animals. These lived and acted very much like human beings; in fact, were often endowed with even greater powers, in that they possessed a miraculous magical ability which enabled them to shape the world to its present condition. Later these spirits withdrew to the sky, or to the world beyond the ocean, and the animal-men either joined them or were transformed, at the time of the birth of the human race, into their present shapes. The end of the present tale refers to this period of transition where man was getting ready to succeed the animal.

Here is the story:

Long, long ago the Catowl lived by killing deer. Every morning when he started to hunt he whistled for his two dogs. Immediately they came rushing to him, and at his command ran up into the hills. The Catowl then strolled leisurely down to the river and watched. After awhile he would see a deer come swimming down with the current, into which the dogs had driven it farther up-stream. Clambering on a rock where the river was narrow and the current swift, the Catowl waited until the buck was abreast of him and then jumped on his antlers. There he ensconced himself comfortably, sailing down the river in great jubilation until the buck was tired and had reached a convenient landing place. There the Catowl would leap ashore, dragging the game after him by its horns, and then cut its throat. From the landing it was but a short way to his house; thus he lived in ease and plenty.

Now one morning, having followed this usual pursuit and being engaged in skinning his prey by the river, he noticed that it was an unusually fat animal, and his mind was joyful with anticipations of a particularly juicy meal.

Looking up, he saw a gigantic and forbidding figure standing by him. The brush grew up one side of the stranger's face, and water ran down the other; a tremendous knife was stuck in his belt, and altogether he seemed most terrifying to the little Catowl. When the monster opened his mouth and said, "I will carry your buck up to the house for you," the Catowl, although suspecting nothing good, did not dare to refuse. So he helped the visitor take the deer on his back, and started to show him the way home. The giant, however, had his own ideas of what was right, and when they came to the parting of the trails he merely walked on with his load. He was considerate enough, however, to throw the kidneys to his host.

"Well, well," thought the Catowl to himself, "that was unfortunate." But having nothing else to do, he went on to his house and made shift with the scrap which the giant had thrown to him.

In the morning he determined to try for better luck. Again he whistled for his dogs and waited at the river. Another fine buck came swimming by, and again the Catowl, after his free ride, killed him. With the carcass all ready to be carried home—lo, the same horrible stranger stood before him and insisted on being the burden bearer. The Catowl demurred in his heart, but was too small to refuse, with the result that he again lost the whole of his venison except for the kidneys.

The third morning, Coyote, known as a great wanderer and mischief maker, and withal a boaster, although resourceful in many tricks, dropped in at the Catowl's home. He said: "I hear that some one has been coming and taking away your deer from you."

"Yes, he is doing that regularly," answered the Catowl.

"Well, leave it to me," intimated Coyote, "and I will dispose of him."

"I very much wish you would," the Catowl told him.

"Where are you in the habit of killing and skinning your deer," the Coyote asked him nonchalantly.

"Just below here by the river," said the Catowl. "If you will step down there and wait for me, I will bring the deer right to you."

So Coyote went down to the landing place, hid in the brush, and waited. Before long a big buck came swimming down the river, battling

hunter, who soon jerked him up on the bank, cut his throat, and began to skin him. Coyote, the great hero killer, was waiting courageously for the mysterious stranger to appear, but when he saw the nice looking venison his appetite overcame his anticipated bravery, and he whispered to his friend: "I am terribly hungry; throw me some of the soft meat from the belly, and I will chew it while I am waiting." The Catowl tossed it to him, and again and again Coyote repeated his request until he had had his fill.

At the exact moment when the carcass was ready to be taken away, the stranger appeared. Immediately Coyote's vaunted bravery began to leave him. He had instructed the Catowl to act as if nothing unusual were impending, but slyly to help him by pulling back as much as he

FIG. 12.—"On his antlers he carried the young hunter."

dared while assisting the giant in loading the carcass on his back. At that moment, while the monster was thus impeded and squatted on the ground, Coyote would advantageously jump him. Now, the Catowl obediently followed the stern command to assist the giant in getting the deer on his back, but at the same time remembered Coyote's directions and dragged the load backwards.

"Why are you holding me back? Let go!" growled the big stranger. Here was the advantageous opportunity, and the Catowl delayed the giant a moment longer. But Coyote's heart had sunk completely, and he was afraid to stir or even show himself, with the result that the stranger arose and carried away his prey.

When he was well out of sight, Coyote came sneaking up to the house after the Catowl. "That is a very powerful fellow, and what is more, he is endowed with magical power," he said, "but now that I have sized him up, I will surely kill him tomorrow." In this vainglorious fashion Coyote glossed over his cowardice, but as the event proved, he had seen enough to really nerve him to the task the following day.

In the morning the same procedure took place. Coyote's greedy hunger once more got the best of his warlike resolutions, and while waiting for the giant he gorged his belly with pieces of meat which his friend obligingly gave him. This time, however, when the giant was stooping and the Catowl impeding him from behind, Coyote actually leaped from his hiding place, plunged his knife into his body, and killed him. Then the Catowl saw, what the keen Coyote had observed the day before, that the giant's formidable knife was nothing more than a piece of bark shaped to resemble a weapon. In spite of his size and forbidding appearance, the stranger had been comparatively harmless.

Coyote, however, was not satisfied with dispatching him, and determined to rid the world for good and all of him and his kind. So he said to the dead body, which, according to the habits of the people of those days, was likely to return to life again:

"You will not be an evil being any longer. You will no more roam the earth in human shape and make trouble. From this time on, when you live again, you will swim in the water and be a mud puppy."

Suiting his action to the words he threw the dead body into the creek, where after awhile Coyote's prediction proved true, and the giant turned into the little ugly but harmless reptile.

Still intent on pursuing his reform to the utmost, Coyote said to his friend, "Now carry your dinner up to the house. I will join you there later, but first I will go to see where our dead friend came from." So he followed the giant's tracks, which he found went up a creek, and after reaching the top of the hill he saw smoke in the distance. He headed for this and came to a large Indian house. Inside, children were playing and laughing. Coyote peeped in and saw several boys, but was even more pleased with the view of great quantities of venison hanging up. "Well, first I will kill the little fellows, and then for a feast," he said to himself. He stepped into the house and tried to finish the boys. He dashed them against the ground, threw them into the fire, but nothing seemed to hurt them. As he was knocking them about or holding them down in the flames, they were still laughing and whispering to each other: "There is no danger of our dying by burning while our hearts are hanging up under the roof."

Coyote's sharp ears having heard this remark, at once he said to himself: "Why, of course, that is so." Letting the children lie, he clambered up, threw down their hearts, tossed these into the fire, and as they were consumed the boys rolled over dead. So the world was rid of this brood of evil doers.

Now the monster-slayer thought himself entitled to a full reward. He ate all the venison he could and then loaded himself with more to the limit of his carrying capacity. When his pack became too heavy he rested and ate some more of it. Then he thought of an ingenious scheme. "Why should I travel further when I can enjoy a good sleep? I will take two of the nicest strips of the meat and hang one over each of my ears. Then when I wake up I will not even have to reach over for another meal, but will merely shake my head, swing one of my earrings in front of my face, and snap it up."

With this ideal of ease and satisfaction before him, Coyote made his arrangements. As he sat there in contented anticipation, looking drowsily across the creek, he saw the Bald Eagle sitting watching him on a dead tree. Always delighted to tease and taunt, Coyote called out to him: "Here, old Deep-set Eyes, come over here and eat this,"

and he held up a choice piece of venison. Of course he had no intention of giving away a single scrap of his treasure, and the Eagle, who knew the fellow from long ago, was well aware that he was only being made game of. He was exceedingly angry, but, like a wise man, said nothing. In fact he never stirred from his perch on the stump, but his mind was working intently. "Go to sleep, go to sleep," he kept muttering quietly towards Coyote, concentrating his thoughts intently on this event. Between the Eagle's magic wishing and Coyote's natural disposition under the circumstances, the trickster soon dozed off.

When he was sound asleep the Eagle silently flew down and carried away his meat. He even carefully took off Coyote's earrings. Having safely stowed away his prize in a tall tree, out of sight and reach of Coyote, he went back to his old perch. There he quietly sat, leisurely eating a fat piece of venison.

After a time Coyote awoke, and remembering his beautiful scheme, turned his head sidewise and snapped, but his jaws closed on empty air. He swung his head toward the other side and snapped again, but with no better result. "Well, what has happened now?" he thought in bitter disappointment. Looking up, he saw the Eagle chewing.

"That must be my meat," he said to himself, "and, after all, he must have taken it away from me." Somewhat crestfallen but still unabashed, he crossed the creek, and sitting down at the foot of the dead tree, called up to the Eagle: "Please throw me down some; let me have at least one piece." But revenge was as sweet to the Eagle as his venison, and he made no reply except leisurely to finish the piece he was engaged at—while Coyote watched him, tantalized — and then finished by throwing down at the disappointed waiter the empty pack basket in which Coyote had carried the load.

By this time Coyote was really hungry again, so he thought: "I

FIG. 12.—"Please throw me down some; let me have at least one piece."

will go back and visit the Catowl." He returned to the latter's house but it was empty. "Where can he have gone?" he thought. He looked around and finally saw him on a tree, also eating. Evidently the little fellow, knowing his companion's gluttony, had thought it best to get all his provisions out of the way. "Throw me some of it, I am hungry, too," Coyote shouted up to him. But the Catowl, ungratefully enough, considering the assistance he had received, pretended not to hear his friend and deigned only to continue his own meal. At last Coyote, exasperated, had resource to his own magical powers.

"Have it your own way now," he said, "but from this time on it will be different. You will no longer kill deer or eat venison. All you will do hereafter will be to catch lizards and mice." And so it was thenceforth, and that is why the Catowl of to-day no longer hunts deer.

Now, not long after, there was a powerful spirit living in the ancient village of Amaikyara. This little Indian town, although sadly deteriorated, is still invested with the odor of sanctity among the modern Indians, on account of the many important events believed to have taken place there in the period of long ago. The spirit who at that time had his abode in the sweat-house there, was a father to all the animals that are in the world, directing them and planning for them just as if he had himself created them. Now, he had lived in this sweat-house from time immemorial, but he knew that the human race was very nearly ready to come into existence. So he thought to himself: "What shall I do now that human beings have almost grown up? How shall I provide for this event before I go away?"

At last he decided that he would make bows and arrows for them to use, and that these would enable them to gain a subsistence. So with his magic power he manufactured bow after bow, a whole row filling one side of the house. Then he called all the hunting people of that time, who are now the hunting animals—the Dog, the Wolf, The Panther, the Wild Cat, the Eagle, the Hawk, the Chicken-hawk, the Owl, and last, and in some ways most insignificant, Coyote. The Bear, it will be noticed, was not included, and is not considered an animal of prey by the Indians.

"Come into my sweat-house, all of you," the spirit summoned them. And when they had entered, he said: "Now, as night comes on, go to sleep. As you awake in the morning, each of you can take a bow. The first one to awake will have first choice, and the last one to awake will have to take what is left. Whatever bow you receive will be yours forever to hunt with, and your powers for killing game will be proportionate to the quality of weapon you obtain in the morning."

Then one after the other stretched himself and dropped off to sleep. But Coyote was cogitating, trying to devise a way of beating all the others. "I believe I will not sleep at all; then I will surely be the first. Moreover, I will sit up instead of lying down, and will take my station by the door. Then if I should doze off and one of the others precede me, he will awake me as he goes out, and I will be at least second." So he did this, but before long his innate unmanliness and lack of character manifested themselves and he felt himself becoming drowsy. "I must keep awake at all hazards," he thought, so took two small sticks and with them propped up his eyelids, thinking that this would help him.

So the night wore on, the others all sleeping peacefully, and at last Coyote dropping off, too. So powerfully did sleep overmaster him that he pushed the little sticks clear through his eyelids without feeling them. The spirit, however, was superior to the animals and did not sleep at all. All night he sat watching and thinking: "Who will be the first to wake up and have the greatest power?"

At last, just before the first faint streak of dawn, one of the sleepers stirred. It was the Dog, man's best friend, as the sequel shows, who silently arose, picked out the finest of the bows, and stole out of the house. The next to awake was the Panther, who had second choice, and also left the house. Then followed the Wolf, the Wild Cat, the Eagle, the Chicken-hawk, the Hawk, and the Owl. Each of them took the bow which would give him the power for securing his food and went away.

At last, when the sun was high up, Coyote awoke from his slumbers. Quickly he snatched the sticks from his eyes and looked around; it was already broad day. Only one bow was left, and that a poor, worthless, little thing. There was nothing for him to do except to take this.

So he went off, but on account of the scant powers which his miserable weapon conferred, he could kill no large game. Whatever he tried he failed at. At last there was nothing left that he could hope to catch except gophers. So he sneaked to a flat, and with drooping ears, sat on his haunches near their holes, leaping upon them as they stuck out their noses, and now and then succeeded in killing one. When his catch was slim, he snapped up such grasshoppers as he could find. Coyote is still doing that to-day, and such, according to the Indians, is the contemptible ending of a career that, in spite of its resourcefulness, was marred by meanness of spirit.

The Dog had a very different career. His bow giving him the best powers, he was content not only with pursuing deer and game, but steadily chased the Wolf, the Panther, and the other animals of prey, trying to take away from them their bows and their powers. Wherever he went, he was on their trail, trying to overtake them, much to their annoyance.

At last he came back again to the sacred village of Amaikyara where he had won the prize. But things had changed. The old spirit had withdrawn to the other world across the ocean, people, real human beings, were living there now, and in amazement they watched the Dog come towards them. Singling out the head man, the Dog addressed him:

"Let us be companions; I will be your mate. From now on I shall no longer be able to speak; I shall no longer be like you; but I should like to go through the world with you. Take this bow from me, learn to use it, and you and I together will hunt. The Wolf has come to me and told me that he is no longer my friend. There is enmity between us, but friendship between you and me. The Wolf has threatened that whenever he can catch me in the mountains he will kill and devour me, but you and I will help each other like friends."

Then the man promptly accepted the gift which meant so much to him, and since that time human beings have shot the arrow and have had dogs to help them in chasing deer. So the relation between these two beings was established. But the Dog had one thing more to say. It was the last time he spoke. He said to the man:

"You prize this bow I have given you, and it is worth much to you for food; but there is another thing about it which you do not yet know, though you will learn it to your sorrow. For hunting, this weapon is excellent, but for other things it is not good. There will be times when it will kill me. There will be times when your descendants will be killed by it. One man will be killed by another. There will be fighting and war, and human beings will die. As long as the human race exists people will obtain their food with the bow, and also will die from its arrows in battle."

Thus this all-important Indian weapon was, according to Indian belief, invented and given, and until the introduction of firearms by the white man, the Dog's prediction of its value and its danger was fulfilled.

THE NEW ANGLER'S LICENSE.

By Ernest Shaffle, Executive Secretary, California Fish and Game Commission.

During the years 1911, 1912 and 1913 the Fish and Game Commission of this state produced at the hatcheries and distributed in the public waters of the state, where the public could fish for them at lawful seasons, about 35,000,000 trout. These figures are less impressive than the actual condition that has been brought about, which is that, with the constantly increasing population and better and better means of getting about, the state is having good fishing each season—fishing, in fact, that is improving in most regions. While it is impossible for any one to determine the degree of improvement over natural conditions brought about through artificial propagation, it seems to be true that the work of the hatcheries and the very general distribution of trout that has been made in this state during the last twenty years has placed fish in streams previously barren, and kept up and even increased the stock in other streams more favored by nature.

It is, of course, evident that such an extensive programme of hatching and distribution as has been carried on in the state, particularly during the last few years, must have cost a great deal of money. As a matter of fact, such work, with the attendant necessary scientific investigations and police patrol, has cost the state in the neighborhood of $60,000 a year, or a total of approximately $180,000 for the three year period just ending. For this great work the state has made no direct appropriations, although prior to 1911 the state appropriated each year amounts ranging from $30,000 downward. Since 1911 it seems to have been the idea that the hatcheries could be kept up and the increasing distribution made out of the proceeds of money paid by hunters for the privilege of hunting. In addition to the resources of the hunting license fund, there has been each year about $25,000 derived from the sale of market fishing licenses, and collected as fines imposed on lawbreaking commercial fishermen. These amounts were, of course, entirely inadequate and it has been necessary to borrow around $30,000 a year from the hunting license fund to carry on the fish work needed and demanded by the public.

This condition brought about the enactment at the 1913 legislature of a law imposing a tax upon those who fish for pleasure, who may be called either "sportsmen anglers" or simply "anglers," which is the older and perhaps better term. This law was first proposed

it be shown so conclusively as to bring about its enactment. The law provides generally that all persons over eighteen years of age must obtain a prescribed license before fishing for game fishes, that the license must be displayed upon demand of any officer authorized to enforce the fish and game laws and, further, that it shall contain an agreement signed by the owner that any game fish in the owner's possession shall be exhibited to a deputy fish and game commissioner upon demand. The law also designates the species that shall be known as game fishes. They are the tuna, yellow-tail, jewfish or black sea bass, albacore, barracuda, bonita, rock bass, California whiting, also known as corbina, and the surf fish, yellowfin croaker, spotfin croaker, salmon, steelhead and other trout, charr, whitefish, striped bass and black bass. All of the fish not mentioned in this list may be taken by pleasure fishermen without licenses, although it is presumed that the average person will not be content with taking non-game fish, but that he will prefer at least to do some fishing during the year for the more desirable varieties.

The legislature, having due regard for the rights of the rising generation, has specifically provided that no person under eighteen, no matter of what sex or nationality, shall need an angler's license. This fact knocks in the head the statement that the angler's law is intended to restrict fishing and that it is a direct injustice to the boys.

The new licenses are handled in the same manner as the hunting licenses, with which procedure every one is now familiar. They may always be obtained at the offices of the county clerks and, in most counties, of deputy county clerks located in each town. In most of the large towns they will be found on sale in gun and hardware stores. They may also be had at the offices of the Fish and Game Commission in Sacramento, Los Angeles, San Francisco and Fresno, while people in out of the way districts will have every opportunity to obtain them from the deputy commissioners, usually known as "game wardens."

Incidentally, the first issue of the new license is regarded as being the most artistic license of the kind ever issued. It bears on the face a representation of a familiar fishing scene reproduced from a photograph, while on the back is given a synopsis of the laws relating to game fishes. This plan of giving an outline of the laws on the license seems to be new in the United States, but has been used in Germany for a great many years. It is not only convenient, but should guarantee that every person fishing will have with him at all times complete information in regard to the fishing laws.

Naturally enough, a question has arisen as to what need there is of this new license and as to what use is to be made of the revenues derived from its sale. In the brief outline at the beginning of this article it is shown that the propagation of fish has been paid for in large part since 1911 by the hunters and that without direct appropriation such a questionable course would need to be continued in future. It is clearly an injustice to expect the hunters to pay for work the results of which are enjoyed by the fishermen, a great many of whom never hunt. It would also seem that so long as a license scheme is followed in this state, those who fish, as well as those who hunt, should pay for the sport that appeals to them the most.

In this connection, a few figures concerning the hunting situation in California may be interesting. During the fiscal year ending June 30, 1913, 160,000 individual hunting licenses (in round numbers) were issued in this state. For the same period, as nearly as can be ascertained, the state of New York issued about the same number of hunting licenses, while Illinois sold around 185,000. No other state in the union came within fifteen or twenty thousand of the sale in California, from which it is evident that California is now either the second or third state in the union in its hunting class and this, in spite of the fact that both Illinois and New York, as well as a number of other Eastern and Middle West states have much greater populations. What is even more significant is the fact that in Great Britain with a population of over 45,000,000 there are now only about 68,000 licensed hunters, or less than one half the number in California. Comparison of British and Californian conditions would be interesting, but comparison is fruitless as the conditions have no similarity.

It is impossible to give an estimate of the number of fishermen in this state, but it is supposed that the number is at least equal to that of the hunters. If this estimate is correct, the state will have in 1914 close to 350,000 people, most of them of adult age, tramping through the woods and along the streams, and each one of them expecting to take home at night a mess of game or fish. Obviously, most of these people would be sorely disappointed if it were impossible to add to the natural supply of fish, or to so control the taking of game that no person should have more than his share. With the hatcheries the state now has and with those that can be built during the next few years, out of the proceeds of the sale of the angler's licenses, it will be possible to more than keep pace with the catch of fish, always provided, however, that we do not have too many dry years like 1912 and 1913. A dry year like 1912 destroys more fish than could be taken by twice the number of fishermen that we have in the state, besides affecting the streams themselves so that the proper natural conditions are not regained for several seasons.

A very necessary use to which the fishing and hunting license money must be put in this state is the patrol or policing of the streams and of the hunting grounds. With so many people, of so many nationalities hunting and fishing it is inevitable that a great number of infractions of the law will occur. While every effort is made to prevent such infractions by the dissemination of information in regard to the laws themselves and of the necessity that causes them to be placed on the statutes, certain people seem bound to fish during breeding seasons and to so ignore the rights of others as to load themselves up with more than the bag limit allowed one person. As there seems to be no other way to deal with these people they are arrested by the game wardens and turned over to the courts, in somewhat lessening numbers, however. As an example, the arrests made in the *biennial* term ending ending June 30, 1912, totaled 2,063, while the arrests for the *calendar year* 1912 were 1,235, which indicated a considerable increase. For the fiscal year ending June 30, 1913, however, the cases have dropped back to 1,085 which, assuming that the game wardens have been as vigilant as in the past, seems to show

that the laws are being more closely observed. It may also be stated in passing that the California game wardens make more arrests each year than are made in any other state, with the exception of New York, which has over 50 more wardens than California, three times the population, with less than one third the area.

THE CATFISH IN CALIFORNIA.

By George Neale

The introduction of catfish into California can be considered one of the great achievements of the California Fish and Game Commission and of more importance from an economic and commercial point of view, perhaps, than the introduction of the striped bass.

The bullhead or horned pout (*Amciurus nebulosus*), known here in California as the yellow or mud cat, and the blue catfish (*Amciurus natalis*), were introduced into our waters in the year 1874. One

Fig. 14.—Common bullhead (*Amciurus nebulosus*).

hundred and forty-four were obtained from the Schuylkill River, Pennsylvania, and later others were received from the Missouri River. All of these were planted in the San Joaquin River near Lathrop, San Joaquin County.

The catfish at once became acclimated to our waters, as have nearly all other introduced fishes. They increased to remarkable numbers. The flood waters of the Sacramento and San Joaquin delta have distributed these fish to such a degree that there is no body of water in either the Sacramento or San Joaquin Valley, stream, creek, slough, lake, or lagoon that does not contain these fish in some quantities. They inhabit waters turbulent or placid, muddy or clear; and a temperature of 75 degrees which proves deadly to other species, except perhaps the carp, is quite congenial to them. The catfish is perhaps the only fish that is immune from the muddy flavor noticed in fish of other warm waters. Left to themselves catfish have become distributed from brackish salt water near the coast to the upper Sacramento, near Red Bluff, and specimens have been taken far above this point. They have been successfully transplanted to every portion of the state, from the Mexican line to Oregon.

The time and place of spawning depends upon conditions, climatic and otherwise, as is the case with all other spawning fishes. The spawning season at low altitude is generally from April 1 to

July 31. A female of the blue variety, of over two years of age, or about 9½ or 10 inches in length, will spawn about 250 eggs, increasing to about 2,500 for a five-pound female. The time of incubation is short, taking but a few days from the egg to the tadpole-looking embryo. Catfish have a very high or perfect percentage of fertilization. The spawning bed is usually selected in still, muddy water where the young can feed on small water larvæ, etc. On investigation I have found mosquitoes in the embryo stage in large quantities in the stomachs of the young fish.

Catfish are migratory in the sense that they invariably travel from their natural abode up stream to spawn at the first rise of the rivers in the spring. These migrations take them to the unreclaimed and overflowed lands in the Sacramento and San Joaquin region, which at that time become huge natural spawning beds and hatcheries.

The catfish can live anywhere, so long as it has sufficient water to cover it and an available food supply. This fish will eat almost anything, from a mutton chop, bone and all, which I once found in one, to a minnow, dead or alive. Catfish are highly predatory, inasmuch as they will eat the spawn of any other fish. Fortunately, our other good food and game fishes do not spawn on their pastures. Otherwise they would prove disastrous to the spawn of other fish.

The importance of the catfish as a food supply is unquestionable. The quality of its flesh and its fine shipping properties have probably been the means of its near extermination. There is no fish much superior for the table. The only thing that can be charged against the catfish is its appearance.

In the year 1900 these fish were no doubt at their maximum numbers. During 1900 the shipments of dressed catfish from Sacramento alone were enormous. Shipments were even made to the native home of the catfish, Missouri and Mississippi River points. They supplied the markets of Chicago, Salt Lake, Denver, Portland, and other middle and eastern points.

In the year 1905 there were shipped by two firms alone from Sacramento, 730,771 pounds of dressed catfish, representing about two thirds of their net weight. These statistics were gathered by Mr. Wilcox of the Bureau of Fisheries, Washington, D. C., and the writer. Since that year there has been a steady decline in shipments until now very few, if any, are exported from California.

It was a common occurrence ten years ago for a person to catch a hundred fish in a day's angling, whereas today it is a rarety to catch sufficient for a meal, and even then they are too small to clean.

The only method of catching these fish is by the fyke or ring net, which is a set net, the small mesh seine, or with hook and line. So we must look to one or more of these methods for correction. The fyke net is the most deadly net in use today, and, fortunately, its use is permitted only in the San Joaquin River and tributaries. This net is set near the bank of the river or slough, and sometimes entirely fills the slough with its width. Its mouth is always open, day and night. It fishes while the owner is asleep. That which enters never escapes. In years of experience I have seen every fish in our river in its maw—salmon, steelhead, striped and black bass, perch, and all other varieties. I have seen it catch everything from a

coon and mink to a turtle. Its use should be prohibited here as it is in nearly all other states.

Until the year 1909 no restrictions were placed on the capture of catfish. They could be caught in any manner, in any quantity, in any net, with any size mesh, and in any and all seasons. With no restrictions and the great demand from all over the United States for them it is no wonder our waters are depleted.

In the year 1909 a law was passed protecting these fish, making it unlawful to sell fish of less than eight inches dressed, exclusive of head. Two years later, having taken nearly all of the eight-inch fish, a powerful lobby of the fish trust succeeded in passing a law reducing the sale limit to seven inches, which is the present law, with a close season of two months. Now, as a catfish of seven inches dressed, or eight and a quarter inches alive, has not yet spawned or reproduced itself, what can be the logical result! Extermination is the only answer.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical, and similar periodicals.

All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California.

January 30, 1915.

"The effectiveness of game protection is governed by the interest of the people and the spirit of those who hunt and fish."—W. *L. Finley.*

A GOOD START.

WE are glad to be appreciated. Words of commendation and encouragement continue to pour in from many who have seen the first number of "California Fish and Game." Mr. Henry Chase has again proved himself our staunch friend by publishing an article in "Forest and Stream" in which he speaks of our quarterly as "a veritable mine of accurate information, data, scientific facts, and interesting reading." This is exactly what we wish "California Fish and Game" to be. We hope that as time goes on we will come nearer and nearer this ideal.

May we again ask the hearty support of every one in the state who is interested in that great resource—California's wild life? Help us in our endeavor to really conserve this valuable resource.

THE NON-SALE OF GAME.

Our friends, who took an active interest in the endeavor to pass a non-sale law at the general election on November 3, will wish to hear a word regarding the defeat of the measure. The following is a summary of the vote obtained from the Secretary of State:

58 counties:

No	361,446
Yes	353,285
Majority	8,161
Total vote cast	714,731

Southern California went two to one in favor of the measure. In the northern part of the state the following counties only returned a majority in favor of the bill: Humboldt, Santa Clara, Calaveras, El Dorado, Lassen, Nevada, Fresno, Kern and Tulare. Alameda and San Francisco counties polled a very strong vote against the non-sale. All in all, the majority against the measure was surprisingly small. Any one of the opposing factors might have been instrumental in bringing about this small majority.

California is not the first state to turn down a good law, nor will this be the last good measure to be defeated. At this time we have no qualms of conscience, however, for we feel that we took the right side of the question and did our utmost to bring about a favorable vote.

The report of Mr. W. P. Taylor, Secretary of the California Associated Societies for the Conservation of Wild Life, shows that about $3,700 was wisely spent in a well-conducted campaign to bring about the passage of the non-sale law. It is estimated that this organization brought campaign matter to the attention of at least one million citizens of the state; that over one hundred lectures were given and about ten thousand personally signed letters were sent out. Similar work to that carried on by the California Associated Societies for the Conservation of Wild Life, was taken over by the Wild Life Protective League of America in southern California. Just as effective work was doubtless carried on by this organization in the south. When we can point to the work of these two organizations alone, we feel as though conservationists have worked hard to uphold the most needed step affecting game here in California. Mr. F. M. Newhart, President of the California Fish and Game Commission, interested himself personally in the campaign and was instrumental, with the help of his friends, in having published a beautifully illustrated booklet entitled "Your Fish and Game." Credit is also due many others who gave of their time and money to help make the campaign a success.

We attribute the failure of this measure to the following three things:

1. The unfortunate wording of the bill, allowing many voters to vote against

the bill when they believed that they were voting against the sale of game.

2. The misapprehension of many who thought that the measure favored gun clubs.

3. The vindictive attitude of several prominent newspapers in the state.

The cleverest move of our opponents was to try and shift the responsibility for this bill on the gun club, making it thus appear that the bill would favor the private gun preserves. Owing to the general feeling toward gun clubs, many voters were deluded enough to vote against the measure. As a matter of fact, the bill was first drafted and supported by men who were not members of gun clubs and who were not even hunters, but men who were interested in preserving the wild life of the state as a natural resource.

We are glad to report that only 14 newspapers, with a combined circulation of 214,442 persons, opposed the non-sale of game; whereas, 170, with a combined circulation of 617,416, favored the bill.

Soon after the election, the "Sacramento Bee," published an editorial to the effect that those who backed the non-sale bill, having been defeated by a fair vote of the people, should let the matter drop and cease to make a further attempt to pass similar legislation. We hardly agree that this has been a fair vote of the people, and we certainly do not believe that game conservationists should now cease to attempt legislation which will be instrumental in saving California's wild life.

Every one must agree, no matter how he may have voted, that the non-sale campaign just closed was a campaign of education and that it will have a lasting effect on future game legislation.

GAME RESOURCES VIVIDLY PORTRAYED BY MOVING PICTURES.

Some remarkable moving pictures depicting the wild life of the west are now being shown throughout the state. Mr. Edward A. Salisbury, director of the Educational Film Company of Los Angeles, has spent almost two years and many thousands of dollars in obtaining moving pictures of birds and animals in their own homes. The pictures were taken in the Klamath Lake region of northern California and southern Oregon. In each instance the attempt was made to obtain photographs of animals so as to show their whole life from birth to maturity. Great patience had to be displayed in procuring the pictures. Blinds were built in which the operators waited hour after hour with muffled camera. In all, about thirty thousand feet of film was taken. Only seven thousand feet of that is being shown. The rest of it is to be used in educational and scientific work.

The seven reels being shown are as follows:

1. Life history of steelhead trout—Part I. Fish in trap; artificial spawning of female; eggs hatching; trout fry; distribution.

2. Life history of steelhead trout—Part II. Typical fishing scenes; nesting mallard duck, Virginia rail, Wilson snipe, and mudhen.

3. Treeing and roping wildcats and mountain lions.

4. Farallone cormorants, great blue herons, and white pelicans on their nesting grounds.

5. Birds and animals of prey—Nestling bald eagles and turkey buzzards; porcupine and skunks.

6. Quail and pheasant hunt, showing typical hunting scenes.

7. Hunting geese for the San Francisco market.

Not only are these pictures of interest to the hunter and fisherman, but they vividly portray wild life to the nature lover. The last reel, showing hunting geese for the market, shows the type of slaughter which has too long gone on in this state, and brings convincing evidence of the necessity for better conservation.

That these pictures are really preaching conservation is evident from the following quotation taken from an editorial in the Fresno Herald:

"Since it now appears that the state has overlooked the importance of Amendment No. 18, prohibiting the sale of game with the exception of wild geese, under certain conditions, the appeal of the Salisbury films becomes all the more insistent. As his pictures teach, such wild waterfowl, now considered delicacies upon California tables, will become as extinct in this state, if the indiscriminate

and ruthless killing goes on each year, as the passenger pigeon, common at one time in all sections of the United States and hunted by the million because of its epicurean flavor when served up baked to a delicious brown. Conservation of bird and game life is no less an issue in California to-day than conservation of human energies and resources. The man who says, 'Why not kill 'em? Plenty of ducks and quail, aren't there?' is simply stupidly ignorant of the hazard and risk that surround every duck and quail egg. He knows nothing of the chance against every duckling and young bird ever reaching maturity and the great overwhelming odds against its ever reaching the mating or the nesting stage and reproducing its species, as long as men with pump guns dig pits for themselves."

LAST PASSENGER PIGEON DIES.

The last surviving passenger pigeon died at the Cincinnati Zoological Garden on September 1, 1914. This particular bird was a female and was hatched in captivity twenty-two years ago. The specimen has for many years been the only living bird to represent the millions of these birds that formerly existed in the eastern and middle states. A standing reward of a large sum of money for the past five years has failed to bring forth any clue as to the existence of any living passenger pigeon.

The immense numbers of passenger pigeons which at one time existed in the eastern United States was one of the greatest zoological wonders in the world. Alexander Wilson, one of the pioneers of American ornithology, tells of a breeding place of these pigeons in Shelbyville, Kentucky, which was several miles in breadth and was said to be more than forty miles in extent. Over one hundred nests were to be found in a single tree, and the ground was strewn with broken limbs of trees, eggs and dead squabs. In speaking of a flight of these birds he says that during one afternoon he estimated that the continuous flock overhead contained at least 2,230,272,000 pigeons.

After there became a market demand for these birds, market hunters destroyed them by the thousands and carloads were shipped to the market in New York and other large cities. "At the great nesting places both Indians and white men felled the trees in such a way that the larger trees in falling broke down the smaller ones and threw the helpless squabs to the ground. The squabs were gathered, their heads pulled off, their bodies thrown into sacks, and large droves of hogs were turned in to fatten on those which could not be used." From ten to thirty dozen were often caught at one time in a bird net.

By 1878 the birds were greatly reduced in numbers and the last great slaughter for the market occurred in Michigan during this year. It has been estimated that three hundred tons of birds were sent to the market in 1878. Birds were still to be seen on the market in Chicago as late as 1886, and small flocks were seen in 1895. But later than 1906 we have no record.

It is no wonder, therefore, that the death of a single bird should have caused so much interest the world over. The bird itself was presented to the National Museum, where it will be useful in teaching a lesson to coming generations. The death of this pigeon typifies the complete extermination of a valuable resource of our country. It should forever teach us that our wild life is ours only in trust and that we owe much to succeeding generations. Our own wild pigeon, the band-tailed pigeon, with much the same habits as the passenger pigeon, received no protection until the Federal Migratory Bird Law was passed. We trust that this needed protection has not come too late to save this valuable species as a member of our fauna.

HOW THE MIGRATORY BIRD LAW WORKS.

The Assistant Chief of the United States Biological Survey recently reported to us that the Weeks-McLean Migratory Bird Law has already proved its worth, in spite of the very inadequate appropriation for its enforcement. In many places in the east and middle west more ducks have nested the past year than have been seen in those particular localities for ten or fifteen years. The elimination of spring shooting in many places has produced remarkable results. It is also

reported that certain birds like the wood duck, which were absolutely protected for a term of years by the new law, have increased wonderfully even in the short time during which the law has been in operation.

The enforcement of the Migratory Bird Law has brought about results which are far beyond even the most sanguine hopes of the supporters of the measure. It is needless to say that conservationists everywhere are delighted with this demonstration of a law which was said to be impracticable.

MARKET DUCKS IN SAN FRANCISCO AND OAKLAND.

Not nearly so many ducks were received at San Francisco and Oakland on the first day of the season this year as were received last year. The following table shows the distribution by species of those received at San Francisco. The larger part of these ducks went to the market.

Number of Ducks Received at San Francisco and Oakland, October 15, 1914.

San Francisco:	
Mallard	212
Gadwall (gray)	66
Widgeon	20
Pintail (sprig)	716
Teal	353
Spoonbill	46
Scaup Duck (bluebill)	1
Redhead	2
Canvasback	--
Total—San Francisco	1,416
Oakland	438
Total	1,854

A total of 438 ducks were received at Oakland, making the total number of ducks received at San Francisco and Oakland, 1,854. About 500 more were received in private bags.

As can be seen from the following comparison, more ducks came to the San Francisco market during November of this year:

	October	November
1913	19,380	20,918
1914	12,614	28,425

It has been estimated that about 1,000 ducks are taken from the Alvarado marshes each week end. On December 6th at least 1,125 birds were obtained in this district.

The latest move of the market hunter in his endeavor to get his ducks to market is to ship them to a fictitious address. By some arrangement the limit of ducks is delivered to the correct place, no matter what the address is. Even though the former game transfer companies have been put out of business, the Fish and Game Commission still has problems to solve as to the manner in which the violator can be caught.

26,000 MILES OF RUNNING STREAMS IN CALIFORNIA.

It has been estimated that if all of the water in the streams and lakes of California were to be confined in a stream sixty feet wide and thirty feet deep, that the stream would reach around the world twenty times. In other words, the stream would be over 500,000 miles long. There are 26,000 miles of running streams in this state in which fish can live. Does it seem reasonable, therefore, to believe that a force of seventy-two deputies is sufficient to properly patrol our streams alone, without taking into consideration our game covers at all.

NEWSPAPER PUBLICITY.

The San Francisco "Call" has kindly offered to assist in bringing to the citizens of the state reliable information regarding game. During the coming months Dr. H. C. Bryant, in charge of the Bureau of Education and Publicity of the California Fish and Game Commission, will supply a series of articles dealing with the game fish, birds, and mammals of California. The first article which describes the distribution, habits and status of the California valley quail, was printed in the "Call and Post" under date of November 25th. Other articles will appear from time to time.

RECOMMEND CHANGES IN GAME LAWS.

The California State Fish, Game, and Forest Protective League met recently at Santa Cruz. President Charles A. Redding of San Rafael presided. The meeting was given over to a discussion of needed changes in the fish and game laws. The following were some of the recommendations made:

That the bag limit for ducks be reduced from 25 to 15 a day.

That the shooting season for ducks be reduced to conform with the federal law.

That the bag limit for quail be reduced from 140 birds a week to 30, and from 20 birds a day to 15, and that the season be reduced from four months to two months.

That the deer season be reduced to six weeks. That the open season in the Coast Range extend from August 1st to September 15th, and in the Sierra Nevada Range from September 15th to November 1st.

That the bag limit for deer be changed from two to one; that spike bucks or younger fawns be protected, and that the running of deer with dogs be prohibited in close season.

That fifty acres of land at Cyprus Point on the Seventeen Mile Drive near Monterey be set aside as a national reserve.

"THE GOOD OLD DAYS."

As far as abundance of game is concerned, we can certainly point to "the good old days" as being better than the present. We recently saw a letter which made the statement that in the season (September 15-March 15), 1882-1883, two men, shooting for the market six days each week, killed 27,000 ducks. This record shoot took place in the Sacramento Valley. Every one conversant with the conditions at the present time will willingly concede that no such shoot as this is possible anywhere in the state at the present time. The writer of the letter, himself one of the hunters, is now a game conservationist and is very much opposed to even the smaller slaughter of game by market hunters at the present time.

We wish that we were able to place in front of our readers exact figures as to former kills and those possible at the present time. We believe that such figures would be convincing proof of the immediate need for the better protection of our game birds and mammals.

THE ALIEN HUNTER.

It is a well known fact that the alien hunter violates fish and game laws much more often than any one else. The alien has long been the most important problem which the Fish and Game Commission has faced. The following note regarding a Supreme Court decision on the Pennsylvania law prohibiting aliens from possessing firearms is therefore of interest. The note appeared in "Current Items of Interest," July 22, 1914:

"The Pennsylvania law prohibiting aliens from possessing guns, which, since its passage in 1909, has been sustained by the various state courts, was upheld as a constitutional measure by the United States Supreme Court on January 19, 1914. The law was designed to check the great destruction of birds by low-grade immigrants."

A CORRECTION.

Owing to the short time allowed for the publication of the first number of "California Fish and Game," a number of errors crept in. One of the worst ones is to be found on page 9, in Mr. Holder's article on "Attempts to Protect the Sea Fisheries of Southern California," where the statement is made that the group of islands of which Santa Catalina Island is one, are "one hundred thirty miles" off Los Angeles County. In justice to Mr. Holder it should be stated that this phrase should belong with the Santa Barbara Islands, as most people are well aware that Santa Catalina is nowhere near this distance off Los Angeles County.

HATCHERY AND FISHERY NOTES.

SUPERINTENDENT'S REPORT OF FISH DISTRIBUTION.

SISSON, CALIFORNIA,
October 27, 1914.

HON. BOARD OF FISH AND GAME COMMISSIONERS, *State of California*

GENTLEMEN: I respectfully submit herewith a brief report of the operations of the Department of Hatcheries.

The distribution of trout from Sisson hatchery is rapidly nearing completion. The season has been remarkably successful. The fry were all in excellent condition, and we have received many compliments from applicants who received allotments of fish this season. Following is a brief statement showing the number of fish reared and distributed by the differ-

ent hatcheries and stations operated during the season of 1914:

Sisson Hatchery.		
Loch Leven trout	1,674,000	
Eastern brook trout	1,043,800	
Rainbow trout	1,057,000	
Steelhead trout	2,250,000	
Black spotted trout	1,750,000	
Large lake trout	15,800	
		7,832,000
Quinnat salmon	21,294,000	
Silver salmon	95,000	
		21,389,000
Total		29,221,000

Five hundred and twenty-three surveys have been made for screens to be installed in canals and ditches diverting water from the streams of the state. Four hundred forty-one legal notices have been served on the owners of canals and ditches, and we have received reports that two hundred fifty-six screens have been installed.

The number of screens installed and ladders constructed, above given, does not

Fig. 15.—Members attending meeting of Pacific Fisheries Society held at Seattle, June 10-12, 1914.

Tahoe Hatcheries		
Black spotted trout	2,882,000	
Large lake trout	95,000	
		2,977,000
Price Creek Hatchery.		
Steelhead trout	406,000	
Quinnat salmon	3,948,000	
		4,354,000
Ukiah Hatchery		
Steelhead trout		550,000
Wawona Hatchery.		
Black spotted trout	200,000	
Large lake trout	22,000	
		222,000
Total trout distributed		11,987,000
Total salmon distributed		25,337,000
Total		37,325,000

Screen and Ladder Investigation.

To date there have been 130 surveys for fish ladders made. Sixty legal notices have been served and blue prints for ladders furnished the owners of dams. We have received reports that 59 ladders have been installed and dams and falls removed.

represent the number actually in, as we have been unable to obtain exact reports from every district. I have given only the number that have been actually reported as being completed.

Respectfully yours,

W. H. SHEBLEY,

Superintendent of Hatcheries.

THE PACIFIC FISHERIES SOCIETY.

On June 10, 1914, a number of prominent men interested in fish and fisheries met at the University of Washington, Seattle, to form a new organization—the Pacific Fisheries Society. Mr. Carl Westerfeld, member of the California Fish and Game Commission, was elected president. Mr. Henry O'Malley and Professor Trevor Kincaid, vice-presidents, John N. Cobb, secretary, and Russel Palmer, treasurer. The following compose the executive committee: Dr. B. W.

Evermann, Director California Academy of Sciences, San Francisco, Cal.; C. McLean Fraser, Director Biological Laboratory, Nanaimo, British Columbia; Dr. Charles Frederick Holder, Pasadena, California; Leslie H. Darwin, Washington Fish and Game Commissioner, Seattle, Wash.; M. J. Kinney, member of Oregon Fish and Game Commission, Portland, Oregon; Ward T. Bower, Pacific Coast Agent U. S. Bureau of Fisheries, Seattle, Wash., and M. D. Baldwin, Esq., member Montana Fish and Game Commission, Kalispell, Montana.

Dr. Hugh M. Smith, United States Commissioner of Fisheries, was present and read an interesting paper on "The Pacific Policy of the Bureau of Fisheries." Mr. John N. Cobb, editor of the Pacific Fisherman, contributed a most interesting article on "Neglected Pacific Fishery Resources." A number of other important papers were read. Those present were entertained by trips to the nearby fisheries and by an expedition on Puget Sound on board the U. S. Fisheries steamer "Albatross." On the latter trip the different sorts of scientific apparatus carried by this steamer were exhibited and explained.

The object of the Pacific Fisheries Society is to bring together each year those particularly interested in fish and fishing on the Pacific Coast. It is hoped that this organization will become on the Pacific Coast what the American Fisheries Society is on the Atlantic Coast. The next annual meeting will be held in San Francisco, probably at the same time as the meeting of affiliated scientific societies.

Fig. 14.—Dead and dying ducks at Tulare Lake, September 21, 1913. Sick birds remained in a paralytic state for several days before death occurred. Photograph by F. C. Clarke.

A PERMANENT RECORD OF FISH PLANTING.

There is now being prepared at the Sacramento office of the California Fish and Game Commission an exhaustive record of fish planting in California. A survey has been made of all of the water sheds of the state and maps show where there are waterfalls, rapids, etc., and where fish ladders and screens have been placed. The exact amount of water in each stream and those which go dry in summer are indicated. Accompanying data shows exactly where the different kinds of fish have been planted and the success obtained. Consequently the Commission will be better able to know exactly where fish planting will be most successful. Mr. Charles L. Gilmore, Engineer of the Commission, is compiling the

work under the supervision of Mr. Frank M. Newbert, president of the California Fish and Game Commission.

TUNA DISAPPEAR.

Much disappointment has resulted in southern California cannery circles on account of the sudden halt, about September 18th, in the catch of tuna or albacore. At that time the fish, which had previously been running in large schools for more than two months, disappeared, and have not been seen since. Whether they have gone north or off shore, or escaped to the waters of the coast of Lower California remains a mystery. Several experts from the United States Bureau of Fisheries have been on the ground nearly all summer for the express purpose of solving this problem, and they are said to be as much at sea on the question as the amateurs. In the mean time the packers are hoping that the theory that the fish have gone up the coast and that they will pay the local waters a call on the way back, is true.

The season, while it lasted, was exceptionally good, some two-man boats bringing in as high as ten tons in two days. The white men made a better showing this season than the Japanese, which is rather surprising and unusual, as it was the Japanese who first taught the whites how to catch the tuna in commercial quantities.—PACIFIC FISHERMAN, October, 1914.

FISH LIVE TWO MONTHS IN ICE.

The "Pacific Fisherman" reports that a Swiss scientist has succeeded in keeping fish alive which were frozen in ice for two months. Success was attributed to the fact that small pieces of ice were placed in the water before it was slowly frozen, and to the fact that the ice was thawed very slowly. This suggests a means of transporting live fish. Whether such a method would prove practicable is still to be ascertained.

FIG. 17.—Fish ladder over Clough Dam on Los Molinos River, Shasta County, California. Similar fish ladders have been placed over practically all the important dams in the state, thus giving fish access to the headwaters of the streams.

SALMON STORED IN ICE.

Last year tons of salmon were stored in ice. This was so successful that this year many more tons were thus preserved to await a better price after the season had closed.

NEW RULING RELATIVE TO FISHING IN NAVIGABLE WATERS.

WAR DEPARTMENT,
WASHINGTON, October 28, 1914.

To whom it may concern:

The attention of those engaged and of all others who propose to engage in fishing

in the navigable waters of the United States, in or tributary to San Francisco Bay, in the State of California, is called to the following provisions of section 10 of the River and Harbor Act of March 3, 1899, as follows:

That the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States is hereby prohibited; * * * and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same.

All persons are hereby notified that the use of nets floating or drifting with the tide or current for the purpose of catching fish in the waters of San Francisco Bay, San Pablo Bay, Carquinez Strait, Suisun Bay and the Sacramento and San Joaquin rivers and all navigable tributaries of the aforesaid waters, is considered an unreasonable obstruction to navigation, excepting as hereinafter specified, and that fishing with nets is prohibited in the following fairways which are reserved for navigation:

The fairway of the ferry boats between Vallejo Junction and Vallejo; Benicia and Port Costa; Benicia and Martinez; Mallard Slough and Chipp's Island.

Approaches to wharves and docks and steamboat landings.

Regulated channel from M. Near's Point to Beacon No. 1, and dredged channel from Beacon No. 1 to Beacon No. 6, at mouth of Pinole Creek.

From Point Pinole to Oleum Wharf between the buoys on the north side of the dredged channel and the 18-foot contour on the south side of the bay.

Mare Island Strait.

From Oleum Wharf to Port Costa, 1,000 feet out from the face of the docks and wharves.

Between Port Costa, Army Point and Selby Point, except east of the Nevada Track to Steamboat Wharf at Martinez, south of ferry course.

Between Selby Point and New York Slough, from the left bank to the center of the deep water channel.

The use of nets in these waters elsewhere than in the above described fairways, for the purpose of catching fish, is considered permissible under certain conditions and restrictions, and, until further notice, the Secretary of War will interpose no objection to such use, so far as the interests of navigation are concerned, provided the following conditions are observed:

(*a*) That all nets, floating or drifting with the tide or current, laid out in the above named waters be laid from the bank towards the channel; that all nets in the same vicinity when laid out from the same bank shall not cover more than one half the width of the channel; that nets laid out from both banks must not overlap in any case; and that where the channel is so narrow that more than one half its width is required for the passage of vessels, nets shall be picked up and removed in time to permit the passage of an approaching vessel without hindrance or delay.

(*b*) That the shore end of every net shall have attached to it a float, painted white, and large enough to carry, in an upright position, three feet above the surface of the water, a white flag 18 inches by 24 inches by day, and a white light by night, visible all around the horizon.

(*c*) That a fishing boat with one or more men in it shall always be in attendance while the net is in use and shall always be at the channel end of the net.

(*d*) That a license shall be obtained for the use of the net as required by the laws of the State of California, and that every person using or operating a gill or floating net in any of the above named navigable waters of the United States shall cause to be placed upon the corks of each end of such net and upon the cork nearest the center thereof, the number of his state fishing license for the current year, said number to consist of figures not less than one inch in height, and shall also cause to be placed and maintained on each side of the bow of the boat used to operate such net, the same number, said number to consist of figures not less than nine inches high and five inches wide with strokes one and one quarter inches wide and spaced two and one half inches apart and to consist of white figures on black ground or black figures on white ground.

Failure to mark boats and corks with the license number as above prescribed will be considered a violation of these regulations.

(*e*) That when the net is laid from the right bank, which will be considered the right-hand bank going down stream, towards the channel, the fishing boat shall carry a permanent black flag by day and when the net is laid from the left bank the fishing boat shall carry a permanent red flag by day; the size of such flags shall be 18 inches by 24 inches or larger, and they shall be carried not less than four feet above the gunwale of the boat. This arrangement of colors conforms to that for buoys marking channels and navigators will govern themselves accordingly, namely red flags to be left on the starboard hand and black flags on the port hand by vessels going up stream.

(*f*) That lights shall be displayed as prescribed by law. (See Act of Congress approved June 7, 1897, entitled "An act to adopt regulations for preventing collisions upon certain harbors, rivers and inland waters of the United States.") When the net is laid from the right bank towards

the channel the fishing boat shall show a red light to vessels coming up stream and a green light to vessels coming down stream. When the net is laid from the left bank towards the channel the fishing boat shall show a green light to vessels coming up stream and a red light to vessels coming down stream. On being approached by or approaching another vessel such lights shall be exhibited in sufficient time to prevent collision. This arrangement conforms to the rules for the running lights of vessels under the supposition that the fishing boat is heading towards the net and will require a clear way in that direction. Navigators governing themselves accordingly and following the usual rules for avoiding collisions will avoid the net.

(g) That when fog occurs, signals shall be given from the fishing boats as prescribed by law. (See Act of Congress approved June 7, 1897, referred to above, Art 15, Sec. 2 (d) and 2 (f). To show its position or location four short blasts of a fish horn shall be given at intervals from the fishing boat until the approaching vessel is in sight, when signals shall also be given from the fishing boat by a flag or light indicating on which side the vessel should pass.

HENRY BRECKINRIDGE,
Acting Secretary of War.

CONSERVATION IN OTHER STATES.

THE ANNUAL MEETING OF THE NATIONAL ASSOCIATION OF GAME COMMISSIONERS.

The annual meeting of the National Association of Game Commissioners was held at the National Museum, Washington, D. C., on October 2-3, 1914. Members from seventeen states and representatives from four associations and bureaus were present. Mr. W. L. Finley, of the Oregon Commission, was the only member present from the Pacific Coast. A number of interesting papers and addresses were given. At the close of the meeting the following resolutions were adopted:

WHEREAS, It has been conclusively determined that many species of birds are subject to various diseases due to the presence of specific germs and animal parasites, and

WHEREAS, Experience has demonstrated that shipments of international, interstate and even of lesser distances have resulted in serious extension of disease, either directly from the birds, or indirectly through infection of ground or water supply, be it

Resolved, That this association urge upon individuals and sportsmen's clubs intelligent consideration of the dangers which may attend every shipment of birds, notably quail and ducks, and particularly do we urge upon the state and federal governments a complete, strict and effective quarantine of all importations of live birds.

Resolved, That the governor of each state be and he is hereby requested to appoint ten delegates to each annual convention of game commissioners. Such delegates shall take part in the meeting but shall have no vote.

Resolved, That the incoming president when elected be and he is hereby directed to raise certain general committees, and special committees, by groups of states, and commit to them the problems of Game Conservation for solution and report at the next annual meeting.

Resolved, That we are impressed with the benefit that may come to the cause of game and wild bird protection through the help of the three hundred thousand Boy Scouts of America, and recommend that wherever that may be possible, the Boy Scouts be enlisted in the great work and we thank them for work already done in this direction.

WHEREAS, Extended experience has proved that fish, mollusks, and other aquatic animals are amenable to artificial propagation, and that the per acre yield of food from the waters and from the land under water can be enormously increased by methods essentially identical with those so successfully employed in agriculture, and

WHEREAS, The constantly increasing demand for food can be permanently met not merely by discovery and destructive exploitation of new fishing grounds, but that this demand for food can only be met permanently and economically by increased production after the methods and practices of agricultural science, and

WHEREAS, The future continuance and necessary extension of our fisheries will require the development of methods of increasing production, and

WHEREAS, Production must include commerce in fisheries products, be it

Resolved, That this association is of the opinion that the work of the Bureau of Fisheries is and properly should be chiefly allied with problems of production as well as distribution of aquatic food products and that the activities are and should be more closely allied with the type of activities carried on by the Department of Agriculture; therefore, be it further

Resolved, That this association appoint a committee to confer with the Secretary of Commerce and Labor, and the Secretary of Agriculture and the Commissioner of Fisheries with power to represent this society in considering the problem involved.

ORGANIZATION OF SPORTSMEN IN PENNSYLVANIA DO FINE WORK.

At a recent convention of the United Sportsmen of Pennsylvania it was voted to employ a state organizer with a salary of fifteen hundred dollars. He will travel through the state, organizing local camps and furthering the work of the organization. The association publishes a monthly magazine, "The Pennsylvania Sportsman." Competent lecturers are

furnished on application and the lectures given are free to all.

"The standard working policy of the association is such that it requires a local camp of twenty-five members or less to plant at least two cans of fish a year, give out or distribute at least two bird boxes a year, plant or distribute at least fifty trees, and feed the wild game during the winter at least $2.00 worth of feed. Camps of fifty members are required to do twice the above amount of work, and larger camps accordingly. Each local camp, of course, can do as much more work as they may wish. They must report at the annual convention what work has been done." (Fish and Game Conservationist and Warden's Journal, September, 1914.)

THE ECONOMIC PRESERVATION OF BIRDS.

Members of the British committee for the economic preservation of birds have issued a statement recommending the following six suggestions as a working basis: (1) Absolute protection during breeding season for all breeding wild birds of whatever kind. (2) Absolute protection for all birds found upon inquiry to be either verging upon extinction, highly localized or of distinctive benefit in agriculture centers. These birds to be known as "Birds of Class I." (3) Regulations to be enforced by government or local authorities under government for species that have commercial value and are not in danger. These birds to be known as "Birds of Class II." The government of the countries of origin to tax the sale of these species and thereby recover the cost of enforcing regulations. (4) The permanent maintenance of an international committee of scientific experts to determine year by year which species belong of right to the respective classes. (5) An international agreement to refuse importation to the world's markets museums and private collections of all species that are found to belong to "Class I." (6) All species in "Class II" to be exported under license. The committee would place at once in "Class I" the following birds: The family of chatterers, the cattle egret, the resplendent trogon, the lyre birds, the rifle bird of Australia, the regent bower bird, the flamingo, the spoonbills, the trogopans, the Impeyan (monal) pheasants, the red bird of paradise of the Waigu Island, the Prince Rudolf, Lawes', Prince Wilhelm's, Rothschild's, Princess Stephanie's and Meyer's bird of paradise. —SCIENCE, August 21, 1914.

MORE MOVIES OF THE SALMON INDUSTRY.

During the latter part of August, E. J. Dwyer took a series of moving pictures of the salmon industry on the Fraser River for the province of British Columbia. These will be used by the province in advertising British Columbia.—PACIFIC FISHERMAN, September, 1914.

DISEASE ATTACKS MOUNTAIN SHEEP AND GOATS.

The United States Department of Agriculture has undertaken the investigation of a serious disease which is affecting the mountain sheep, or bighorn, and the mountain goat in Idaho.

The forest officers think that it is the same disease which caused the mountain sheep to die in great numbers during 1882-83. The nature of the disease is not known, though it results fatally and sheep affected with it seem to have rough and mangy coats and are very much emaciated. Three bureaus of the department are engaged in the study—the Bureau of Biological Survey, the Bureau of Animal Industry and the Forest Service. A competent veterinarian has already gone to Idaho to start the work.—FOREST AND STREAM, November 21, 1914.

MOVING PICTURES OF WILD LIFE IN OREGON.

Mr. W. L. Finley, in charge of the educational work of the Oregon Fish and Game Commission, has obtained some very fine moving pictures of wild birds and animals. Last summer he spent several weeks in the Klamath Lake region obtaining pictures of birds on their nesting grounds. Mr. Finley has just returned from a trip east where he attended the annual meeting of the National Association of Game Commissioners at Washington, D. C., where he showed his pictures. The pictures were shown at several other places in the east and also at the University of California, where many people were turned away on account of the limited capacity of the

lecture room. It is the intention of the Oregon commission to have these moving pictures shown throughout that state and also to have them exhibited at the Panama-Pacific Exposition. The day when people flocked to see a stereopticon lecture has passed. "Movies" are now the only thing which will attract them. We are glad to see many of the state fish and game commissions keeping abreast of the times.

THE DIN OF WAR AND THE FEATHERED TRIBE.

The following recently appeared in the Oakland "Tribune." We do not know on what authority the article was published but it sounds quite plausible. War and game conservation hardly go well together.

"The feathered tribe of Belgium and northern France has been dispersed by the din of war.

"In all districts of the Marne it was noticed after the battle that the birds had disappeared. The Argonne forests also have been nearly depopulated of all kinds of game by the continual turmoil in those regions. Driven to detached woods and thickets where their dangers would have been increased in time of peace, they now find security.

"Apart from their enforced exile, birds are not the least fortunate of beings in these times, game shooting being prohibited in France.

"The markets furnished evidence that some poaching was going on, however, and the minister of war issued a warning that the sale of no other than imported refrigerator game would be tolerated. Early in the war soldiers supplemented their rations by taking a hare or a pheasant here and there, but this was stopped by order.

"Scarcity of game in the market is no hardship, for it is a small part of the alimentation of Paris. The arrivals amount annually to only 1,000 tons of native and 450 tons of imported game, while the arrivals of domestic poultry, alone, aggregate 21,000 tons.

"Belgium sends 50,000 larks to Paris each season, while the game importations from other countries are: Austria, 2,500 deer, 80,000 partridges, 50,000 hares; Italy, 25,000 quail; Australia, 100,000 rabbits, 20,000 hares and 50,000 larks; England, 40,000 pheasants and 30,000 partridges.

"No doubt considerable game that did not get away from the continually lasted war zone has been destroyed, and the sportsmen who have shooting preserves in these parts of the country are pessimistic as to the future; they think it will require several years to repopulate these regions. On the other hand, the prohibition of one season's shooting in the territory not affected by hostilities, it is thought, will result in immense benefit to game in general, and that next year and for many years to come all kinds of game will be more plentiful than ever before."

LIFE HISTORY NOTES.

DUCKS DIE ON TULARE LAKE.

The usual epidemic among ducks was noted again early this season on Tulare Lake. Mr. E. W. Smalley reports that not nearly so many birds died this year at last. Many of the reports regarding the epidemic were grossly exaggerated. Mr. Alex Wetmore, of the United States Bureau of Biological Survey, spent several days investigating conditions on the lake. Mr. Wetmore spent several months studying the similar epidemic which appears on Salt Lake, Utah, each year. We hope that we may be able to give our readers the results of his investigations at a later date.

Mr. F. C. Clark carried on some valuable experiments last year at Tulare Lake and has laid an important foundation for further work. The epidemic seems to be caused by a poison in the water. But to know this is not enough. We want to know exactly what it is that kills off the ducks on Tulare Lake and whether there are any means by which the trouble can be alleviated. Further investigations are planned for the coming year.—H. C. BRYANT.

TWO RECORDS OF THE NESTING OF THE WILSON SNIPE IN CALIFORNIA.

The Wilson snipe (*Gallinago delicata*) is a common bird in our marshes during the winter season. It even occasionally

remains until July, but the birds are not to be seen in the lowlands in late summer. Many hunters have wondered why they were unable to find nests of this bird. The reason for it is explained by the following two records given me by Mr. George Neale.

A nest containing two young was discovered by Mr. Neale early in August, 1912, on the Burton Creek meadow at the north end of Lake Tahoe, Placer County, California.

Mr Charles Flohr, an old-time hunter, told Mr. Neale several years ago that on September 1, 1899, he discovered a nest containing three young in the Sierra Valley, Plumas County, California.

The Wilson snipe apparently nests very late and consequently its habit of staying well into the summer is accounted for. Those birds which remain so late probably nest around the lakes and ponds in our high mountains.—H. C. Bryant.

PRESENT STATUS OF THE PRONG-HORNED ANTELOPE.

Although antelope meat was the commonest meat to be purchased on the markets in San Francisco in the '49er days, yet the year of 1914 finds us with only a few scattered herds in the state. The following information regarding a small herd me by Mr. A. D. Ferguson. Between in western Fresno County was furnished thirty and forty years ago the herd numbered two hundred to three hundred. In 1898 they had been reduced down to about thirty-two. In 1909, one hundred and thirty-eight were counted.

Mr. J. G. Tyler of Fresno reports that on October 31, 1914, he noted seven prong-horned antelope about fifteen miles east of the mouth of the Little Panoche. One of the number appeared to be only a little over one-half grown. Twenty-eight were seen in this general vicinity last spring.—H. C. Bryant.

Fig. 14.—A partial view of the largest fish screen in the state. This screen, installed by the Sacramento Valley West Side Canal Company, in Glenn County, is seventy feet long and fifteen feet deep.

QUEER SPECIMENS OF DEER FROM THE WHITNEY REGION.

Mr. S. L. N. Ellis of the Fresno Division reports to us that during August, 1914, two very interesting specimens of deer were obtained near Mount Whitney. One appeared to be an hermaphrodite. This deer had very rudimentary and

strangely formed horns. The other specimen was a doe with horns. Mr. Ellis says that this is not the first time that a horned doe has been taken in this region. The horns of this particular specimen were very gnarled and rudimentary. The hides and horns of both of these deer are to be seen in the office of the Fish and Game Commission at Fresno.

DEER SEASON TOO EARLY.

Practically all of the deer killed in Santa Cruz County during the past season were still in the velvet. Evidently the season in this locality opens altogether too early. All of the hunters in this county are insistent in their demands that the law be changed as soon as possible.—J. H. Hill.

A PORCUPINE IN THE FOOTHILLS OF THE SIERRAS.

A clipping from the Folsom "Telegraph" states that Harry Hilbert of that place killed a porcupine weighing fifteen pounds on November 13, 1914. It is seldom that a porcupine wanders down into the lowlands. Their true home is in the higher altitudes.

WILD LIFE IN RELATION TO AGRICULTURE.

PENNSYLVANIA PAYS TRIBUTE TO FROGS, TOADS AND SALAMANDERS.

Slowly but surely we are finding out that practically every form of life is of some use. For over fifty years we have been studying the food of birds and the more we study the more we discover that birds are to be considered friends of the farmer rather than foes. Some years ago Professor H. A. Surface, Economic Zoologist of Pennsylvania, published a bulletin of 208 pages describing the food habits of snakes. The results of further researches have led him to publish, recently, a similar bulletin on the "Economic Features of the Amphibians of Pennsylvania" (Zoological Bulletin, Vol. III, May-July, 1913, pp. 67–152). A key to species enables the amateur to determine any species of toad, frog or salamander; and there are tables under each species described, showing exactly what has been taken from the stomachs of the amphibians collected. Stomachs to the number of 1,456, representing 24 different species, were examined to obtain the data given.

"The results of investigations show that the amphibians, as a rule, feed upon a class of food similar to that of a toad, a creature whose food has been investigated quite thoroughly. * * * Its value as a consumer of destructive insects and closely related creatures has been established beyond question. * * * In a similar way, the terrestrial amphibians are to be regarded as friends of agriculture, and they deserve protection accordingly.

"In addition to the fact that the amphibians as a whole are constructive rather than destructive to man's interest, some species, as those of the frogs, serve as food for man. * * * In many parts of this country procuring and selling frogs has become a paying industry, so much so that several species have been greatly reduced in numbers. In Pennsylvania, as a result, legislation has been enacted which makes it illegal 'to catch, take, or kill any bullfrogs, only from the first day of July to the first day of November.' A further economic feature of the Amphibians is found in the fact that their young or tadpoles are taken extensively as food for fishes, thus contributing indirectly to the nourishment of mankind, and they are also used as bait by fishermen. In fact, their use as bait has threatened the reduction or extermination of tadpoles and frogs to such an extent that a bill was introduced into the last legislature providing that not more than 20 tadpoles could be used as bait in one day. However, the bill failed to become a law."

So it can be seen that not only are the despised frog, toad, and salamander proved friends of the agriculturist, but they are of such value that legislation has been enacted in order to prevent their complete extermination. It may also be of interest for our readers to know that in Switzerland the edelweis, a flowering plant, and several species of butterflies

are now protected by law because their existence was threatened by tourists and collectors.—H. C. BRYANT.

DIRECTIONS FOR PREPARING AND SHIPPING GAME AND NON-GAME BIRDS OR STOMACHS FOR SCIENTIFIC PURPOSES.

As a usual thing the collections of public museums lack good series of game birds and in many cases they contain but few representations of non-game species. Hunters should therefore aim to ship specimens in good condition to such institutions, and particularly so in the case of rare or unknown species, as such specimens are of great scientific value.

Examination of the stomach contents of either game or non-game birds is necessary to determine whether or not the species are valuable to agricultural interests. Such examination is also an aid in determining what materials serve as food and should be provided on preserves if game birds, particularly waterfowl, are to be attracted by means of food plants.

Stomachs.—When removed, stomachs or gizzards with gullet or crop, if filled with food, should be tagged with the name of the species, the locality and date of capture and the name of the collector. Any information as to the food materials available to the birds and the relative abundance of different kinds of food should be given. If a number of stomachs of one species are collected, all having the same data as to locality and date of capture, they may be put together with a single tag. The specimens should be put in a can or bottle with a tight-fitting top and a 4 per cent solution of formaldehyde (made by mixing one part of the stock solution of formalin obtainable at drug stores with nine parts of water) or 80 per cent alcohol (pure grain or denatured) poured over them so that they are well covered. The preservative should remain on for at least four or five days. For shipment the preservative may be drained off and the can or bottle tightly closed, or the stomachs may be wrapped in oiled or paraffined paper and this in turn inclosed in a stout manila wrapping.

Specimens.—The throat should be plugged with a rather tight-fitting wad of cotton or waste thrust in the mouth and into the upper throat to prevent any blood from an internal wound emerging and soiling the feathers. Any blood on the surface at the time the specimen is prepared for shipment should be scraped off with a knife, but the specimen should not be wet. Specimens should be inclosed in a stout pasteboard or, preferably, a wooden box. If the specimens are to be in transit during cold weather or for only a short distance (so that they will arrive within twenty-four hours after being shot), they need not be drawn, but otherwise the entrails should be removed and the body filled with green grass. Full data as to the date and locality of capture and name of collector should accompany specimens.

Shipment.—Stomachs or specimens, if marked "perishable" and the contents described on the shipping tag, may be shipped either by parcels post or express.

The Museum of Vertebrate Zoology of the University of California, Berkeley, is in a position to receive and identify any species of game or non-game bird, and in connection with its work on the game birds of the state would be glad to receive stomachs of any of the species in question. Material may be sent to the Museum by parcels post or by Wells Fargo & Company's Express.—T. I. STORER, Museum of Vertebrate Zoology, Berkeley, California.

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

September 1 to November 30, 1914.

Offense	Number arrests	Fines imposed
GAME.		
Hunting without license	84	$1,370 00
Deer, close season, killing or possession	13	[illegible]
Deer hides, evidence of sex removed	1	50 00
Female deer, killing or possession	10	500 00
Excess bag limit deer, killing or possession	1	[illegible]
Doves, close season, killing or possession	1	10 00
Ducks, close season, killing or possession	14	[illegible]
Excess bag limit ducks, killing or possession	8	100 00
Night shooting	11	125 00
Quail, close season, killing or possession	20	575 00
Rail, plover, curlew, close season, killing or possession	6	[illegible]
Shore birds, close season, killing or possession	1	25 00
Wild pheasants, killing or possession	2	50 00
Non-game birds, killing or possession	16	124 00
Excess bag limit cottontail, killing or possession	1	25 00
Excess bag limit sage-hen, killing or possession	5	125 00
Swans in possession	1	40 00
Total game violations	198	$3,814 00
FISH.		
Angling without license	6	$120 00
Fishing for profit without license	7	30 00
Using Chinese shrimp or bag nets for catching shrimp, and having dried shrimp in possession	16	60 00
Underweight striped bass in possession	4	50 00
Undersize black bass in possession	1	[illegible]
Undersize catfish—sale	1	10 00
Excess bag limit trout, taking or possession	1	25 00
Taking trout other than with hook and line	1	20 00
Sacramento perch, taking other than with hook and line	2	40 00
Fishing for salmon with nets, Saturday and Sunday	2	30 00
Salmon, close season, taking, possession or sale	4	150 00
Using illegal nets, small mesh	2	50 00
Pollution of streams	1	[illegible]
Undersized Pismo clams in possession	6	100 00
Crabs in possession, close season	9	20 00
Black abalones, possession, close season	5	50 00
Crawfish, possession, close season	1	20 00
Undersized lobsters, possession	2	40 00
Total fish violations	71	$815 00
Grand total, fish and game violations	269	$4,629 00

SEIZURES—FISH, GAME, AND ILLEGALLY USED FISHING APPARATUS.

September 1, 1914, to November 30, 1914.

Fish.

Striped bass	272½	pounds
Salmon	2,895	pounds
Black bass	95½	pounds
Trout	56	pounds
Sturgeon	190	pounds
Catfish	50	pounds
Sacramento perch	3	pounds
Crawfish	431	pounds
Crawfish traps	8	
Crabs	60	
Abalones	275	
Pismo clams	98	
Dried shrimp and shells	250	pounds
Nets and lines	61	

Game.

Ducks	1,676	
Quail	51	
Doves	14	
Plover	15	
Rail	10	
Curlew	1	
Brant	15	
Sandpipers	24	
Shorebirds	4	
Non-game birds	95	
Cottontails	113	
Deer meat	433	pounds
Hides	1	

Searches.

Illegal fish and game	28

FINANCIAL REPORT

STATEMENT OF EXPENDITURES FOR THE MONTHS OF SEPTEMBER AND OCTOBER, 1914.

GENERAL ADMINISTRATION.

	September		October	
Commissioners' traveling and other expenses	$132 85		$85 31	
Salaries of administrative assistants	965 00		977 00	
Traveling expenses of administrative assistants	79 50		18 70	
Rentals, office and other supplies	269 93		594 73	
		$1,447 28		$1,673 74

GENERAL FISH AND GAME PATROL.

San Francisco Division.

Salaries of deputies and employees	$2,531 50		$2,839 50	
Traveling expenses of deputies and employees	964 61		1,062 61	
Rentals, office and other supplies	192 43		202 15	
		$3,688 54		$4,104 26

Sacramento Division.

Salaries of deputies and employees	$2,227 00		$2,553 00	
Traveling expenses of deputies and employees	1,126 87		1,266 65	
Rentals, office and other supplies	112 34		175 69	
		$3,466 21		$3,995 34

Los Angeles Division.

Salaries of deputies and employees	$1,160 83		$1,656 50	
Traveling expenses of deputies and employees	269 20		663 05	
Rentals, office and other supplies	130 83		159 42	
		$1,560 86		$2,478 97

Fresno Division.

Salaries of deputies and employees	$928 50		$1,176 67	
Traveling expenses of deputies and employees	372 97		547 62	
Rentals, office and other supplies	48 17		84 73	
		$1,349 64		$1,809 02

Miscellaneous Expenditures.

Prosecutions and allowances		$336 75		$458 83
General printing		39 32		213 15
Total, general administration and patrol		$11,888 60		$14,732 81
Probable cost general administration and game patrol (60%)		$7,133 16		$8,839 686
Probable cost general administration and fish patrol (40%)		4,755 44		5,893 124
		$11,888 60		$14,732 81

FISHERY EXPENDITURES.

Administration.

Salaries of Superintendent of Hatcheries and assistants	$437 50		$340 00	
Traveling expenses, Superintendent of Hatcheries and assistants	213 71		139 62	
Office and laboratory supplies, etc.	53 94		65 00	
		$705 15		$544 62

Fishery Research and Publicity.				
Salaries	$275 00		$295 00	
Traveling expenses	104 05		157 34	
Supplies, etc.	20 60		12 68	
		$399 65		$465 02
Screen and Fishway Surveys.				
Salaries	$377 00		$325 00	
Traveling expenses	203 15		132 45	
Supplies, etc.	------		1 83	
		$580 15		$459 28
Fish Transplanting (Packtrain, messengers, etc.)				
Salaries	$99 00		$284 75	
Traveling expenses	147 95		100 63	
Repairs and supplies	6 10		10 60	
		$253 05		$395 98
Fish Distribution (car and messengers).				
Salaries	$319 33		$318 33	
Messenger allowance and traveling expenses	186 00		181 50	
Repairs	44 67		19 45	
Supplies	91 28		195 16	
		$641 28		$714 44
Fish Patrol (Launches, etc.)				
Salaries	$259 00		$225 50	
Messenger allowance and traveling expenses	63 60		57 30	
Repairs	------		10 30	
Supplies (oil, etc.)	74 30		96 39	
		$396 90		$389 49
Sisson Hatchery.				
Salaries	$1,205 00		$1,338 00	
Traveling expenses	------		------	
Construction and repairs	95 50		2,038 24	
Fish food and ice for meat	439 80		230 02	
General supplies	142 95		55 91	
		$1,883 25		$3,662 17
Tahoe and Tallac Hatcheries.				
Salaries	$194 00		$10 00	
Traveling expenses	------		------	
Construction and repairs	8 11		------	
Supplies	33 69		------	
		$235 80		$10 00
Prices Creek Hatchery.				
Salaries	------		$137 50	
Traveling expenses	------		50	
Construction and repairs	------		------	
Supplies	------		231 32	
				$369 32
Wawona Hatchery.				
Traveling expenses	$20 35		------	
		$20 35		
Miscellaneous Expenditures.				
Angler's licenses, commissions and refunds		$1,235 60		$726 70
Market fishing license commissions		25 00		85 75
Crawfish inspection		100 00		100 00
Total fishery expenditures		$6,476 18		$7,922 77

GAME EXPENDITURES.

Hayward Game Farm.				
Salaries	$206 00		$216 00	
Traveling expenses	7 15		9 70	
Rent	37 50		37 50	
Construction and repairs			24 93	
Feed for birds	43 00		50	
General supplies	61 10		91 94	
		$354 75		$380 57
Game Research and Publicity.				
Salaries	$162 00		$605 00	
Traveling expenses	49 15		308 79	
Supplies, etc.	169 05		48 35	
		$380 20		$962 14
Miscellaneous Expenditures.				
Hunting license commissions and refunds		$3,787 20		$1,557 10
Mountain lion bounties		240 00		240 00
Total game expenditures		$4,762 15		$3,139 81
Grand total of all expenditures		$23,126 93		$25,795 39
Total of fish expenditures		$11,231 62		$13,815 894
Total of game expenditures		11,895 31		11,979 496
Grand total		$23,126 93		$25,795 39

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

CONTENTS.

	Page
AN ATTEMPT TO SAVE CALIFORNIA ELK—*Barton Warren Evermann*	85
CALIFORNIA'S FUR-BEARING MAMMALS—*Harold C. Bryant*	96
WARDENS AND WARDEN WORK—*T. S. Palmer*	108
THE TENNESSEE POSSUM HAS ARRIVED IN CALIFORNIA—*Joseph Grinnell*	114
THE HALIBUT FISHERY OF THE PACIFIC COAST—*Edward P. Rankin*	116
PUBLIC FISHING VS. PRIVATE HUNTING—*F. M. Nisbet*	119
EDITORIAL	123
HATCHERY AND FISHERY NOTES	127
CONSERVATION IN OTHER STATES	131
LIFE HISTORY NOTES	132
WILD LIFE IN RELATION TO AGRICULTURE	135
REPORTS—	
Seizures and Searches	139
Violations of the Fish and Game Laws	138
Financial Report	140

AN ATTEMPT TO SAVE CALIFORNIA ELK.

By Barton Warren Evermann,

Director of the Museum, California Academy of Sciences.

The complete extermination of any species of animal or plant in any part of its habitat is always a matter of regret. Even if the species be a noxious one, we nevertheless dislike to see it entirely wiped out in any locality in which it was naturally found. If it be a useful species, well known to the laity as well as to naturalists, its extermination is deplored; and when the species becomes extinct, when not a single individual is left anywhere upon the face of the earth, it is regarded as most regrettable. The world will never cease to regret the practical extermination of the buffalo. It will never cease to deplore the actual extinction of the great auk and the passenger pigeon. We all now know the fate of those three interesting species; and when we see other species of interesting animals threatened with extermination, we are naturally filled with alarm. We have learned how thoughtless many people are; how disposed they are to destroy things; how strong the inclination is with many to toss a stone at the frog or turtle resting on a rock or log in the pond; to kill every snake they see. "What a fine morning this is! Let's go out and kill something." That spirit is all too prevalent.

Among the important species of California animals now threatened with extinction is the California valley elk (*Cervus nannodes*). This elk originally roamed in great numbers over the great interior valley of California. It was doubtless most abundant in the San Joaquin portion of the Sacramento-San Joaquin Valley, but its range probably included the entire valley and the adjacent foothills. It was certainly abundant as late as 1854. The early records contain many references to its abundance. One of the earliest records is to be found in the manuscript report of the Viscaino explorations made in 1602. Speaking of the animals in the vicinity of Monterey the statement is made: "Among the animals there are large, fierce bears, and other animals called elks, from which they make elk leather jackets."

Among the most interesting later accounts is that by Mr. Edward Bosqui, the only living charter member of the California Academy of Sciences. In his "Memoirs," to which my attention was called by Mr.

FIG. 19.—California elk in corral near Buttonwillow, ready for shipment. Photo by John Rowley.

M. Hall McAllister, Mr. Bosqui states that, in December, 1850, while walking from Stockton to Mariposa, he saw, as he approached the foothills, "bands of elk, deer, and antelope in such numbers that they actually darkened the plains for miles, and looked in the distance like great herds of cattle."

On his return from Mariposa to San Francisco in June, 1851, when on Dry Creek some seventy miles from Mariposa, east of the present town of Turlock, Mr. Bosqui states he was one morning "suddenly awakened by the heavy tramp and noise of large animals, and on looking through the fog which prevailed I could see indistinctly, not thirty rods away, giant-like figures of elk passing, so to speak, in procession before me. They were tossing their great antlers about and snuffing excitedly. Suddenly, with one accord and with an impulse that shook the ground like an earthquake, they swept out of sight. It was a procession of phantoms such as one might conceive in a night

many, and left an impression on my youthful mind never to be forgotten." (Edward Bosqui, "Memoirs," pp. 62 and 66.)

Speaking of Moraga Valley (in Contra Costa County just back of Oakland) Mr. Bosqui says: "The hillsides were covered with clover and wild oats, and up to 1850 all the country in and about Moraga Valley had been the native haunts of wild game—deer, antelope, bear and elk. Fragments of bleaching elk horns could be found scattered over the valley, and many entire and perfect specimens of the great antlers, although bleached by the sun, I picked up and preserved at the time of our residence there," which was in 1858 and after. (Bosqui, "Memoirs," p. 163.)

In a very interesting book entitled "Death Valley in '49," by William Lewis Manly, to which my attention has been called by Mr. John Rowley, I find a number of interesting references to the California valley elk. In the spring of 1850, Mr. Manly traveled from San Jose

Fig. 28.—Bucks and does just after entering the small corral. Photo by John Rowley.

into and across the San Joaquin Valley, presumably through Livermore Pass. He says: "The next place was a small house made of willow poles set in the ground and plastered over with mud. This rejoiced in the name of "Mountain House." This wayside inn looked more like a horsethief's glory; only one or two men, a quarter of elk hanging on a pole and no accommodations for man or beast. * * * On the summits of the mountains as we passed through we saw, standing like guards, many large buck elk. It was now fifteen miles to the San Joaquin River, and a level plain lay before us. When our road turned into the river bottom we found the water too deep to get through safely so we concluded to go on and try to find some place where we could cross. On our way droves of antelope could be seen frolicing over the broad plains, while in the distance were herds of elk winding their way from the mountains towards the river for water. When far away their horns were the first things visible, and they much resembled the dry tops of dead pine trees, but a nearer view showed them to us as the proud monarchs of the plains" (page 291). After crossing the San Joaquin just below the mouth of the Merced, they proceeded up the

latter stream, and probably near where Turlock now is, Mr. Manly says: "As we came near groves of willows, big, stately elk would start out and trot off proudly into the open plains to avoid danger. These proud, big-horned monarchs of the plains could be seen in bunches scattered over the broad meadows, as well as an equal amount of antelope. They all seemed to fear us, which was wise on their part, and kept out of rifle shot. As we were not starving as we were once, I did not follow them out on the open plain, for I thought I could get meat when we were more in need" (page 392). On the east side of the valley they camped in a low ravine among low hills where game was plentiful. When they awoke in the morning, "Hundreds of big horned fellows were in sight but none in rifle shot, and there was no chance for us to get any nearer to them" (page 395).

Inquiries addressed to a number of early residents of the state have elicited additional information of interest and value. Perhaps the most

FIG. 21.—Although the elk were very wild when first caught, within a few days they would take feed out of one's hands and permit their heads to be rubbed and their ears pulled. Photo by John Rowley.

interesting letter received is that from Mr. H. C. Banta of Oakland, who writes: "I arrived in the state in 1854, overland from Missouri, locating on the west bank of the San Joaquin River near the present Southern Pacific railroad bridge on the Stockton route. For several years I followed market hunting, geese, ducks, elk, etc. In 1854 I found elk plentiful in the foothills west of the San Joaquin, as well as in the tule swamp. Bob Dikeman and Lee Phillips were my hunting companions, and we practically finished up all the tule elk in that section between Martinez and San Joaquin City. The elk were originally ranging over the hills (along the east slope of the open foothills) as far south as Newman, going north as far as Grand Island. They were originally driven from the hills and valley land into the tules by the vaqueros rounding up wild horses and cattle, as well as by hunters. In

1854 they were nearly all driven to the tules, but the finding of horns of six to eight prongs, all over the hills proved how plentiful they had been.

"I found no difference in size between these elk and the Oregon, Washington, Wyoming, and Colorado elk, and felt sure that the bulls would weigh 700 to 800 pounds. They struck me as weighing about as much as an average steer and their horns were fully as big as any elk I have ever killed or seen in other states. Dikeman shot the last cow and calf about 1863, just west of the Sargent ranch on the North Fork of the San Joaquin near the Mokelumne River. The rest of the animals, so far as I know, ranged in the tules and willows between Buena Vista and Tulare lakes, and only on the south side of Tulare Lake, ranging also west into the foothills. I never heard of any except south of the Sacramento River, and as far south as Buena Vista Lake.

"I killed some antelope on the San Joaquin in 1856, running one well-grown fawn down (6 months old), but both horse and fawn died from effects of the run. The antelope were scarce at this time, and finally drifted around Tulare Lake. I never heard of them coming further west than Byron Springs * * * I killed elk at Tulare Lake in 1856 and found them the same as those that ranged up as far as Martinez. Antelope, tule elk and wild horses were plentiful in the Tulare Lake country and in the vicinity of the present site of Fresno at this time. * * * We hunted in the tules with a sloop, using a ladder lashed to the mast for a lookout. When elk were sighted we would break our way through the tules to them, usually finding them on grass land between sloughs. In one instance in Whisky Slough I cleaned up a band of eight single-handed, keeping out of sight. Five were taken with the rifle and I returned to the boat, loaded my shotgun with heavy charge of buckshot and on returning, found the three remaining yearlings still in the vicinity near the carcasses. Following them, I got all three single file, and, as they turned their heads, I got all three at one shot, at an angle, being kicked over by the charge in the bargain. I never heard of another instance of this kind."

There is some evidence that seems reliable that elk once occurred in Santa Cruz and San Benito counties. Mr. J. W. Miller of Watsonville writes that one of the old settlers of that region, Mr. Frank Mauk, says that when he was a boy his father and oldest brother hunted elk in Santa Cruz County, also in the Salinas Valley. Mr. Boutell, a stage driver in San Benito County, says that elk were plentiful in that county in 1864, their favorite range being section 16, range 11 east.

In a letter recently received from Mr. Mauk he says: "In the early fifties my people lived some six or eight miles from Gilroy at the mouth of Redfish Cañon. I remember quite well of my father, my brother George, Captain Adams (afterwards sheriff of Santa Clara County), and a Texan ranger named Bob Poore, coming over the mountain to the Pajaro Valley to hunt elk and returning with wagon loaded. At times the trip extended down to the Salinas plains. In 1882 I took charge of the railroad station at Pajaro (now Watsonville Junction). My watchman was a Frenchman named Joe Pillesier, who came to California in 1843 or 1846. He married a daughter of Salvador Vallejo, a brother of General Vallejo. Mr. Pillesier often spoke of the sport he had in killing elk here, saying that on occasions the vaqueroes would

ride among them and the cattle, single one out, ride him down and hamstring him with a machete. Shortly before the General died, he spent an afternoon with me and spoke of the big elk that used to be found here and rather bitterly of the Americans killing them so wastefully."

Professor John Rockwell, who arrived at San Francisco in June, 1850, has stated to Mr. M. Hall McAllister that a few days after his arrival he joined a party of young men who sailed up the bay to found a city to be called "New York of the Pacific." After passing Suisun Bay they entered the mouth of the Sacramento River and landed their supplies on a point of land on the south shore, making their camp in a small arroyo about a quarter of a mile back from the river. About daylight the next morning they were aroused by the rush and tramping

FIG. 23.—Bull elk in corral near Buttonwillow. His antlers will be sawed off, preparatory to shipment. Photo by John Rowley.

of a large herd of animals. Crawling out of their tent they saw the plain around them covered with a great herd of elk. The animals were rushing back and forth seemingly unable to make out their intruders. The party opened fire on the elk, bringing down one or two, when the herd rushed off at great speed toward Monte del Diablo.

Mr. Payne J. Shafter of Olema, Marin County, has given the following information to Mr. McAllister regarding elk in that county. He says: "Don Juan Garcia (the old keeper of the Country Club) told me that in about 1850 a Spanish priest with a band of Indians went over on Point Reyes and drove a herd of about seventy-five elk on to a peninsula in Limantour Bay. The priest had them nearly all killed for their hides and tallow—bulls, cows, and calves, the last elk of Marin County." Mr. Shafter further says that when he first came to Marin County, in 1862, many antlers in good condition were gathered on Point Reyes and kept as souvenirs. Also that Frank Miller, an old hunter and trapper, told him that, in 1852, he with another hunter named Bell had seen over a hundred elk swim across Tomales Bay and go north

toward Mendocino County. This story is corroborated by Jack Briones, a keeper of the Point Reyes Club, who recently told Mr. McAllister that his father had told him the same story. Point Reyes seems to have been a favorite resort for elk.

Captain MacKenzie, who was for many years captain of the steamer San Rafael, running to San Quentin Point, and later to Sausalito, informed Mr. McAllister that in the early days, probably in 1850, he made a trip in a small sloop to the mouth of Petaluma Creek, and while exploring the marshes in that vicinity he came upon a great herd of elk.

Fig. 17—It was necessary to saw off the antlers of the big bucks to keep them from injuring each other in the pens and cars. Photo by John Rowley.

They were in great numbers. Several were killed before the herd made off, rushing headlong over everything like a herd of stampeded horses or cattle.

Mr. McAllister has obtained some valuable data from Jim Paine, the old Suisun Marsh hunter, who, with his partner, Seth Beckwith, in the seventies and eighties, furnished the San Francisco market with the finest and most toothsome canvasbacks. Paine claims that he killed the last tule elk ever seen on the Suisun marsh. It was, he thinks, in the fall of 1868. He was sculling up the Cordelia Slough after a day's shooting, when, near what is now Teal station, he saw a large cow elk plunge into the slough just ahead. Sculling alongside, he killed the animal with a heavy load of duck shot.

Mr. Chas. A. Allen, the veteran naturalist and collector of Nicasio and San Geronimo, Marin County, has given us the benefit of his experience. He has collected in Marin County for forty-two years. In his earlier years he found elk antlers very plentiful about Point Reyes from Bolinas north to the mouth of Tomales Bay. The elk

seemed to inhabit a strip of territory some five or six miles wide. They appeared to have limited their range to the open lands along the coast. Forty-two years ago all the ranch buildings had elk horns nailed up on the barn or other buildings. Evidently the elk had entirely disappeared from Marin County before 1872, the year of Mr. Allen's arrival there.

Whether the Marin County elk were of the same species as the San Joaquin Valley elk is not certainly known. It may be that the elk of the heavily forested, humid region along the coast from Marin County northward is a distinct species. The facts can be determined only by comparison of material from the two regions. But whatever may be the facts as regards this matter, it is clear that elk were very abun-

FIG. 24.—The crate used in transferring the elk from the corral to the railroad cattle-pens. Photo by John Rowley.

dant in the San Joaquin Valley and adjacent foothills, certainly as late as 1850 to 1854. From that time they decreased rapidly. In the early seventies it is said the herd had been reduced to a few individuals—one report says to a single pair—and they were on the Kern County ranch of Messrs. Miller and Lux. It is said that the imminent extinction of the species came to the attention of Mr. Henry Miller of the Miller & Lux Company, and he immediately gave strict orders to all the employees of the company that the elk must not be disturbed under any circumstances, and that everything possible for their protection should be done.

That has been the policy of Messrs. Miller and Lux to this day. The animals were protected. The herd increased. In 1914 it was estimated to contain about four hundred animals. The state game law makes the killing of any elk a felony, punishable by imprisonment for a term not exceeding two years. Although the elk roam at will over the Miller & Lux ranch, doing—the company estimates—from $5,000 to $10,000 worth of damage every year to the alfalfa and Egyptian corn fields and to the fences, they have not been disturbed. That the species was not

exterminated is due, without doubt, to the intelligent interest taken in its preservation by Mr. Henry Miller. It must be admitted, however, that Messrs. Miller and Lux are willing, in view of the very considerable loss the elk are causing them each year, to have the herd reduced somewhat by moving some of the animals to suitable reservations in other parts of the state.

With this object in view, on the sixth of last April, Mr. LeRoy Nichel, on behalf of Miller & Lux, offered to turn over to the California Academy of Sciences all or such portion of the herd of California elk now roaming over their Kern County ranch as they might be able to catch, provided the Academy would undertake to distribute them to various federal, state, and private reservations in the State of California.

Fig. 25.—At Monterey the elk were transferred from the car to large crates, in which they were hauled to the Del Monte Park, where they were liberated October 30. Photo by F. C. Swain.

In 1905 a few elk were taken from this herd and placed in the Sequoia National Park, where they have done fairly well. These and the original Kern County herd are the only elk of this species in existence.

The development of the oil fields and the expansion of agricultural operations in the Kern County region have brought many dangers to the elk herd in that locality. To aid in saving the species from possible extermination it was proposed to place a few elk in each of the various reservations and parks in the state in the hope that they might thrive there and become the nuclei of new herds.

This was the hope of Messrs. Miller and Lux. One of the conditions of their offer was that the animals should be put only in places affording a favorable environment and where they would probably breed.

The offer of Miller & Lux was accepted by the Academy, and plans were made for carrying out the undertaking.

On April 25 and 26, in company with Mr. M. Hall McAllister, through whom Messrs. Miller and Lux made the offer to the Academy, I visited the Kern County ranch for the purpose of consultation with the superintendent as to the best time and method for catching and shipping the animals and regarding all preliminary details. At that time a visit was made to the alfalfa fields in which the elk feed and to the sagebrush plains to which they retire during the day or when disturbed, and about 100 of the animals were seen.

After giving the matter careful consideration it was decided to undertake the catching and shipping of the elk in October. Early in that month Messrs. Miller and Lux constructed a corral one fourth of a mile long and one eighth of a mile wide in an alfalfa field into which the elk were observed to come every night to feed. A wing one fourth of a mile long was run out from each corner of the end toward the foothills. Woven fence wire was put upon the wings at once, but only the posts for the corral proper were placed at that time. After the elk had come down into the field several nights and gotten used to the posts, heavy woven fence wire was placed on the two sides and the rear end of the corral, and the following night about 150 elk came into the corral; then the wire was placed on the posts at the entrance and the animals were trapped. (See figs. 19 and 20.)

The wire fence was very strong and at least eight feet high, nevertheless, some broke through or jumped over it. A good many people came out in automobiles and otherwise to see the elk, and so frightened them that about 100 broke out the first afternoon. Those that remained became quite tame in a few days. (See fig. 21.) Various, diverse and unexpected difficulties came up every day and it was not possible to predict what success would be attained in the undertaking. The animals might break through the corral or jump over the fence and escape; they might escape when being loaded into the crates for hauling to the railroad cattle pens; or escape from the cattle pens; or refuse to eat; or run amuck and kill or injure themselves; or die in the cars while in transit to the parks; any one of a score of things might happen to cause failure.

However, it is gratifying to know that, in spite of all difficulties and uncertainties, Messrs. Miller and Lux succeeded in capturing and placing in the cars for shipment a total of fifty-four elk. These were disposed of as follows:

1. To a thousand acre private reservation of Mr. J. M. Danziger, Los Angeles, six elk.

This reservation is in the Santa Monica Mountains, near Los Angeles. The environment, it is believed, will prove very favorable.

2. To a six hundred acre private reservation of Mr. E. L. Doheny, Los Angeles, ten elk.

This reservation also is in the Santa Monica Mountains, only a short distance from the Danziger ranch, and is under elk-proof fence.

3. To a seven hundred acre park of Mr. S. C. Evans, Riverside, four elk.

This park adjoins the city limits of Riverside and furnishes ideal conditions.

4. To the San Diego City Park, twelve elk.

The conditions here are not entirely as favorable as one would desire, but it is believed the elk will do well. This park was regarded as a favorable location in which to try the experiment of keeping the elk in relatively small enclosures.

5. To the Modesto City Park, two elk.

6. To the California Redwood Park Association, ten elk.

This association is the governing body for the Big Basin reservation,

FIG. 24.—After leaving the crates in Del Monte Park, the elk ran 200 to 300 feet, stopped, went a little farther to a small creek, then crossed to the other side and began feeding. Photo by F. C. Swain.

which comprises some 55,000 acres. It is believed the conditions obtaining there will prove favorable.

7. To the Del Monte Park, ten elk.

These elk were turned loose in the large reservation of the Pacific Improvement Company near Monterey. (See figs. 25 and 26.) The environment, it is believed, will prove favorable.

Recent reports received from the various parties to whom the elk were sent state that the animals are doing well in all cases.

The Academy has orders, which it has not yet been able to fill, for about 100 additional head. An effort will be made to fill these orders next year.

It should be stated that all matters pertaining to the capture and delivery of the elk on board the cars were in the hands of Messrs. Miller and Lux. (See fig. 24.) The actual shipping of the animals was attended to by Mr. A. L. Bolton, assistant curator of mammals, who

performed the rather trying duties with good judgment, skill and entire success. Not an animal was lost or injured after being placed in the cars and all reached their respective destination apparently in excellent condition. (See figs. 25 and 26.) Mr. John Rowley, curator, department of mammals, and Mr. Herring, taxidermist, were on hand at Buttonwillow during the entire time, and saved for the museum of the California Academy of Sciences all the animals that got killed or fatally injured. On the whole, the experiment of distributing the elk to various parts of the state is regarded as having been a success, and it is believed it will do much toward the conservation of this interesting species of big game.

CALIFORNIA'S FUR-BEARING MAMMALS.

By Harold C. Bryant,

Game Expert, California Fish and Game Commission.

The fur-bearing mammals of California have decreased rapidly in the last twenty years and there are, as a result, only a relatively few men who are professional trappers. Once a state which supplied thousands of valuable furs each year, California now counts for but little in the fur markets of the world. And yet even now, with but a remnant left, the sale of furs brings into this state each year a sum not less than $250,000. At the present rate of decrease, however, there is little hope that this sum can long continue to pour into our coffers, even though the price of raw furs continues to rise.

California possesses practically all of the best fur-bearing species of animals. Look over the list: Gray squirrel, beaver, Pribilof fur seal, mountain lion, lynx, coyote, gray fox, red fox, ring-tailed cat, raccoon, black bear, weasel, river otter, sea otter, badger, skunk, wolverine, fisher, and mink.

Already two of the best of the fur-bearers, the sea otter and beaver, have had to be totally protected in order to save them. The grizzly bear is entirely extinct within the state, and the Guadalupe fur seal very nearly so. The beaver of our mountain districts has been entirely exterminated and there are but a few hundred survivors to be found along the Sacramento, Colorado, and San Joaquin rivers.

Although once exceedingly numerous along the coast, the sea otter is now nearing extinction. Two or three were killed just before the law protecting them went into effect in 1913, but few have been reported as having been seen since that time. Bidwell, in Rogers' "History of Colusa County," states that when the county was first settled it was not uncommon to see thirty or forty grizzly bears in one day. There has not been an instance of the killing of a real grizzly in California for the last four years. Apparently "Monarch" was the last surviving member of the species. He died in Golden Gate Park, San Francisco, about three years ago.

The slow decrease of the fur trade has been noted by nearly everybody and yet no attention has been paid to the possibility of conserving the fur bearers as a natural resource to be administered like other natural resources of the state. The chances of being able to do this

grow less with each year, and it is high time that an investigation be instituted so that facts and figures can be at hand to support the legislation necessary.

A search in the early history of California reveals the fact that this state for many years took a very prominent part in the world's fur trade. Companies were formed and ships outfitted on purpose to develop the fur resources. Trade centered in the skins of the sea otter, an animal which furnishes the finest fur known, fur which at the present time sells for fabulous sums. The average price paid in London in 1910 was $1,703.33.

From 1786 to 1790 trade in sea otter skins in California was controlled by the Spanish government and was in the hands exclusively of the padres and Indians. In an old manuscript written by the commandante at Santa Barbara to the governor, dated November 9, 1789, the following numbers of sea otter skins were reported shipped: From Purissima, 74; Santa Barbara, 79; San Buenaventura, 81; besides 32 fox skins. This represented shipments from the southern coast regions only. In 1790 the government monopoly ceased and the padres were deprived of a market. They welcomed therefore the opportunity to trade afforded by American ships at the beginning of the nineteenth century. From 1800 to 1812 a number of American ships annually visited the coast, trading cloth, muskets, and other materials for sea otter skins.

Sturgis (MS) gives the following figures regarding the number of ships in the fur trade in the northwest, the number of sea otter skins and the price brought in the Canton market:

Year—	No. of ships.	No. sea otters.	Sale price.
1799	7	11,000	$25
1800	6	9,800	22
1801	10	13,000	21
1802	8	14,000	20

Even as early as 1785 the capture of sea otters had become of such importance that on October 24, 1785, regulations for the collection of skins were issued by Governor Fages of California. The order was sent to Ignacio Vallejo at San Jose commanding that "anyone who goes out to trade with the Indians for otter skins" shall be punished. The price at the time was $1.00 to $7.00 (Bancroft, 1885 *a*, pp. 439–440).

In 1786 La Pérouse, a Frenchman, making a special investigation in Monterey was told that 20,000 skins could be furnished each year, and many more by establishing new posts north of San Francisco. He makes the statement that before this year otter skins were worth "no more than two rabbit skins," and that the Spaniards did not suspect their real value. (Bancroft, 1885*a*, p. 438.)

In 1801, which was perhaps the most flourishing period of the trade, there were sixteen ships on the coast, fifteen of which were American and one English. Upwards of 18,000 sea otter skins were collected for the China market in that year by the American vessels alone. (Bancroft, 1884*a*, p. 373.) In 1802 "more than 15,000 sea otter skins were collected and carried to Canton."

The first battle of San Diego was precipitated by the trade in otter skins. Bancroft (1885 *a*, pp. 10–12) gives the following account of the affair:

"Several American trading craft made their appearance on the California coast this year (1798), creating not a little excitement in some instances by attempts at smuggling, in the success of which the people were often hardly less interested than the Yankee captains. The *Lelia Byrd* was fitted out at Hamburg by Captain Richard J. Cleveland of Salem, Massachusetts, who had just made a fortune by a four years' voyage or series of commercial adventures in the Pacific, during which he had touched the northern coast of America, but not of California, in partnership with William Shaler, and sailed in November, 1801. Shaler was master and Cleveland second in command. The vessel was loaded with a great quantity of merchandise, which it was hoped to sell profitably on the west coast of America, no matter how, when, or where. * * * They succeeded (1802) not only in selling goods to the amount of $10,000, and obtaining what supplies they needed, but also bought *1,600 otter skins* just arrived from California at prices which assured the success of the trip.

"Sailing from San Blas, January 25, 1803, after careening and 'boot-topping' the vessel at the Tres Marias, our adventurers sailed in February for San Diego, where they were given to understand there was a lot of otter skins that might be obtained advantageously. * * * On the evening of March 17th, the *Lelia Byrd* passed the fort at Point Guijarros without being hailed, and anchored in San Diego harbor. Next day Commandante Rodriguez with an escort of twelve men came on board to comply with the formalities required by superior instructions. * * * He took a memorandum of the provisions which the visitors pretended to need and promised to supply them the next day. At the same time he indicated the necessity under law of an immediate departure, and returned to shore, leaving Sergeant Joaquin Arce with five men as a guard, and giving the Americans permission to land without visiting the presidio. * * * From Arce it was learned that Rodriguez had about a thousand skins, several hundred of which he had confiscated recently from the *Alexander*, Captain Brown. Shaler made every effort to buy the skins, but in vain, because, as Cleveland puts it, 'Rodriguez dared not indulge his desire of selling them to us.' A visit was made to the shore, including an inspection of the battery at the point.

"On March 21st Rodriguez came on board, received his pay for supplies, and took his leave after wishing the visitors a pleasant voyage. Preparations were completed for departure in great disappointment, but it was determined to make a final attempt to obtain the skins. It was known that the soldiers had small quantities which they would gladly dispose of if they could do so without detection. Two boats were accordingly sent under cover of the night to different parts of the bay shore. One returned with a few otter skins, but the other was seized by the watchful commandante, the mate and two men being bound and left on the beach under a guard of three men. Next morning Cleveland went ashore with four men, each armed with a brace of pistols, rescued the captives and brought them off. Sails were set at once and the somewhat hazardous attempt was made of running out past the guns of the fort. The hoisting of a flag and the firing of a blank cartridge from the battery had no effect, and when a nine-pound ball came across her bow the *Lelia* still kept on her course, with the Spanish

soldiers forced to occupy the most exposed and conspicuous positions. As she passed the fort two broadsides from her six three-pounders were discharged." Neither the fort nor the ship were seriously injured. The most interesting and regrettable part of the whole story is that the one thousand otter skins, which the commandante would not sell, finally rotted and were thrown into the sea.

There are said to have been weeks in 1812 in which the Russians established at Bodega killed seven or eight hundred otters in the bay of San Francisco alone. The skins at that time were worth at Kiakta or Mainakin on the borders of Persia and China, to which they were sent, from eighty to a hundred dollars each, so that the profits of early Russian adventurers in California were enormous (Hittell, 1885 *a*, p. 626). The total number of sea otter skins definitely recorded as having been taken by the Russian company in California is 13,000. This probably does not accurately record the total number taken. In San Diego, between 1840 and 1845, a skin was worth about a price equal to that of four or five bullock hides. Sea otters in those days were commonly found feeding along the kelp beds and they were shot with rifles from boats.

Vallejo (MS. 1, pp. 105–6) says the otter were so abundant in 1812 that they were killed by boatmen with their oars in passing through the seaweed; and the Russians killed 15,000 a year for five years, and 5,000 a year down to 1831. This account is probably grossly exaggerated (Bancroft, 1885 *b*, p. 430).

Another account, written in 1816, states 2,000 a year were caught. By this time decrease was noticeable, for Bancroft (1885 *a*, p. 420) says: "The Indians still caught now and then an unfortunate, slow-moving sea otter that came in their way and the padres shipped the small store of skins, or sold them whenever they found a chance. The Russians took a constantly and rapidly decreasing number of otters each year, a number which was greatly exaggerated in the ideas of the Spaniards."

Hittell (Bancroft, 1884 *a*, p. 373) states that the number of sea otter skins taken on the coast annually after 1880 was 5,500, worth in San Francisco $440,000, or $80 each.

There was also established an important trade in fur seals. Captain Wm. Smith went to the Farallones in 1808 with a party of Kadiaks, stayed there two years, and caught 130,000 seals, besides many otter. He took them to China on the *Albatross* and obtained $2.50 for seal-skins and $30 or $40 for otter. (Bancroft, 1885 *b*, pp. 95–96.)

Hittell (1885, p. 285) states that the Russians collected as many as 80,000 seal skins at the Farallones in a single season.

In 1810–11 the *Albatross*, one of the vessels engaged in the fur trade, touched at the Santa Barbara Islands, where were found few seals but many sea otters. During the same years, according to the log of the captain's clerk, W. A. Gale, this ship took from the Farallones 73,402 fur seals. In addition they took from the coast 248 beaver, 21 raccoon, 6 wildcat, 153 land otter, 4 badger, 5 fox, 58 mink, 8 gray squirrel, 1 skunk, 11 muskrat, and 137 mole skins. Sea otter skins to the amount of 639 and 631 otter tails were also taken. The estimated value of this catch at Canton prices was $157,397.

From 1812 to 1840 the Russians kept up an establishment at the Farallones as well as at Ross. The chief object was to secure fur seals, 1,200 or 1,500 skins being taken annually for five or six years.

After 1818 seals diminished rapidly until only 200 or 300 per year could be caught and the business was no longer profitable. About 200 sea lions were killed at the same time, the skins and sinews being used in making boats. No fur seals were taken on the Farallones after 1834. (Bancroft, 1885 *b*, p. 633.)

Soon after the year 1825 trappers began making their appearance in the great valleys of California. In 1826 "Jedidiah Smith crossed the Mojave Desert to San Gabriel Mission and trapped the length of the San Joaquin Valley. Repeating the daring adventure in 1828 he was forced by suspicious authorities to leave the country. * * * Smith's heavy catch of furs revealed to Dr. McLoughlin the rich possibilities of the Sacramento and San Joaquin valleys and opened the way for the exploration of the district by the Hudson's Bay Company. In the autumn of 1828, McLeod was sent south along Smith's trail for that season's hunt. He trapped the mountain streams with excellent success and was returning to Fort Vancouver with pack horses loaded with beaver and land otter skins when he was caught in the ascent of Pitt River by an unexpected fall of snow and obliged to cache his furs and hurry on in order to save his men and animals. McLeod was severely censured for this misfortune, and the following year the California district was intrusted to McKay. He ventured even to the Bay of San Francisco and took 4,000 beaver along its reedy shores, but the fur was inferior in quality to that of the mountain beaver and brought only $2 a pound. The next season Peter Skeene Ogden was transferred to this field, and under his energetic management the Great Valley was thoroughly explored and developed. For ten years (1829–1838) a Hudson's Bay Company brigade made its annual traverse, south in the autumn and north in the spring, between Fort Vancouver and French Camp—the post on the San Joaquin. The cavalcade was a picturesque one, formed in Indian file and led by the chief trader. Next him rode his wife, a native woman, astride—as is common with the females—upon her pony, quite picturesquely clad. * * * Next the clerk and his wife, much in the same manner; and so on to the officers of less importance, and the men; and finally the boys, driving the pack horses, with bales of fur, one hundred and eighty pounds to each animal. The trampling of the fast-walking horses, the silvery tinkling of the small bells, rich handsome dresses, and fine appearance of the riders, whose number amounted to sixty or seventy, made a really patriarchal array. (White, Ten Years in Oregon.)"

"American trappers were not slow to avail themselves of the new hunting grounds revealed by Smith, Pattie, and Walker, and year by year larger parties appeared in the Great Valley. They no longer attempted to pack their furs over the mountains, but sold them to traders at the coast ports, and the traffic grew to considerable proportion, from $15,000 to $20,000 a year. [In 1841, according to Wilkes, the export of beaver was two thousand skins at $2 each; sea otter, five hundred skins at $30 each; elk and deer, three thousand skins at from 50 cents to $1 apiece.] Every trapping party was required to have

a license, and the fees brought in a tidy revenue, highly gratifying to the officials." (Coman, 1912, pp. 208, 210, 211, 214, 216.)

John A. Sutter, a German-Swiss trapper, built an adobe fort three miles above the junction of the American River with the Sacramento, and organized a considerable fighting force. He had the governor's commission to defend the frontier against gentiles and horse thieves. His first business venture was in the fur trade, for beaver were still abundant up the Fork. However, he soon had an opportunity to buy at a bargain agricultural implements, seeds, plants, and draft animals from Bodega, and was thus enabled to develop his estate and to give up trapping as a livelihood.

The Hudson's Bay Company continued operations in the San Joaquin and Sacramento valleys until 1841 or later. Headquarters were at Yerba Buena (San Francisco). Trapping stations were established at French Camp in San Joaquin County and at French Camp in Yolo County.

Writing in 1840, Lanman calls attention to the declining fur trade in the following words: "But the fur trade appears fated to decline upon the eastern as well as the western portion of the Rocky Mountains by the diminution of the animals from which it seeks its profits. This diminution has been obviated in some measure by the Hudson's Bay Company, who have preserved these particular tracts undisturbed. But where those precautions are not used the American or British trader advances to the territory and strips it of its wealth, so that in a short time there will be but little left upon the soil for commercial enterprise."

Beaver and otter were reported as becoming scarce on the Sacramento River as early as 1837.

By 1885 the fur trade had so declined that Hittell (1885 *b*, p. 564) states: "The days of fur hunting, which once was a great business in California, are gone, and it can not be long until wild fur-bearing animals will be curiosities in the country." Since that date a steady decrease has been noted and his prediction is almost fulfilled.

Having now shown the fur trade as it existed in the past in California, let us now look for a moment at the fur trade of the world today, that we may better appreciate the money value of fur-bearing mammals. The immensity of the fur trade is best shown by the following quotation taken from a report by J. Walter Jones to the Commission of Conservation of Canada (pp. 73–83): "The volume of the fur trade is simply amazing to one who has not studied the question. We have figures of Brass of Berlin, who has been in the business for many years and who for thirty-five years has been collecting fur statistics. He estimates the total production of the world as 360,000,000 marks, or $100,000,000. I have been assured that America alone spends $100,000,000 a year on manufactured furs at retail prices. The whole world pays, roughly speaking, for manufactured furs at retail prices about $350,000,000 annually. In Australia the value of pelts is about $6,000,000, while Africa and South America produce pelts worth about $2,000,000 a year. Warm countries, of course, do not produce furs. For Persian lamb—the product of the karakul sheep—America pays wholesale approximately $14,000,000. In America the pelts as sold in our houses—not the prices the trader gets, but the prices after they

come to the wholesale house—amounted to $24,000,000 a year. Asia and Europe each pay about a similar amount.

"In America a greater number of muskrat skins are obtained than of any other fur-bearer, except the rabbit, several million skins going to the market yearly. Of other American animals we might mention the skunk, about one and a half million skins of which are sold yearly; the opossum, about a million; the mink, about six hundred thousand; the raccoon, six hundred thousand; otter, about two hundred thousand; marten, one hundred and twenty thousand; lynx, ninety thousand; beaver, eighty thousand, and fisher, ten thousand."

It can be estimated from figures given by Ernest Thompson Seton in his "Life Histories of Northern Animals" that the revenue to North America for the last seventy-five years, from the sale of the

FIG. 27.—A trapper's valuable catch of furs in the Sierras. This was the catch at one location only. Photograph by Geo. Williamson, Jr.

skins of the commoner fur-bearing mammals, has been $222,735,000, and to the United States $113,950,000. This means that there has been an average annual income to North America of about three million dollars and to the United States of $1,500,000. The average annual fur production of North America in recent years is estimated at $24,000,000. The sale of skunk skins, alone, brings in an income to the trappers of the United States of about $3,000,000 annually.

According to a St. Louis fur importer, approximately twenty-five million fur-bearing mammals were caught in North America last season. These pelts had a cash value of about twenty million dollars.

The total North American catch of last year (1914) has been approximated as follows: Muskrats, 15,000,000; opossums, 2,800,000; raccoons, 2,400,000; skunks, 2,152,000; minks, 630,000; civet cats, 500,000. Vari-

ous other kinds, including foxes, wolves, otters, beavers, fishers, wildcats, lynx, bear, white weasel, martens, wolverines, and mountain lions, amounted to 1,500,000 skins.

Hence it must be seen that in its fur-bearing mammals the United States has an extremely valuable asset, and one which, when the income is estimated, ranks ahead of some of the other natural resources. California formerly ranked high as a fur-producing state. (See figs. 27 and 28.)

The skins of fur-bearing mammals have, since earliest history, furnished men with clothing. In fact, so important were they in the early history of North America that they formed not only a medium of exchange among the Indians, but also among the early settlers.

As far as money value is concerned, furs furnish the most valuable of all the products to be derived from wild animals. At the present time, although furs have ceased to be a necessity and have become a luxury, yet the demand for them is steadily increasing. Furs have become scarce not only because less are produced, but also because more are demanded.

A number of factors have been instrumental in increasing the demand. Population has greatly increased and the relative number of people in sufficiently good circumstances to be able to purchase furs has also increased. The added interest in fashionable dressing to be seen in our cities and the growing use of the automobile, with its luxurious fittings and need of warm clothing, have also been instrumental in increasing the use of furs.

This increased demand for furs has rapidly depleted our supply. Hunters and trappers have penetrated the most secluded haunts of the fur-bearers and a decrease is to be noted everywhere. Nor has the hunter and trapper been the sole agent in the decrease, for the advance of civilization has cleared away the forests, drained the swamps, and continually destroyed the natural homes of fur-bearing animals. The London sale of furs by C. M. Lampson & Company shows that all of the more valuable furs have decreased in numbers from 20 to 95 per cent. Along with this decrease of the numbers of pelts of the more valuable fur-bearers has come an immense increase in the numbers of pelts of the commoner mammals, such as the muskrat, skunk, and lynx. In the offering at the London sales of January, 1914, more pelts of every species except the mink and the civet were offered than were offered in 1913. The increase in the price of pelts during the last twenty years has averaged about 25 per cent for the staple fur-bearers of Canada.

There are two important ways in which we can meet this steady decrease among the fur-bearers. First of all, we can encourage the breeding of fur-bearers in captivity; and, second, we can pass laws which will protect them in the wild during the summer season when their fur is not prime, or we can entirely close the season, thus reducing the number taken each year. By the use of both methods can we alone hope to supply the present demand for furs.

Those who have attempted in recent years to domesticate fur-bearing mammals have found that it is a profitable industry. Already fur farming has progressed beyond the theoretical and experimental stage in Canada and the eastern United States.

It was not until success was obtained in breeding the silver and other color phases of the fox that fur farming was undertaken along extensive lines. Of course, as the price of furs has steadily increased the incentive to rear fur-bearers in captivity has been augmented. The pioneer fox breeders have acquired wealth in their business and have, therefore, inspired in others the desire to enter the same business. As a result of the demand for breeding stock, the price of animals has increased to such an extent that it is beyond the means of the average man. Consequently corporations and partnerships involving a capitalization of as high as ten million dollars, have been formed for farming the silver fox. The industry has even spread to Russia, where the sable and several species of fox are now extensively farmed.

The success of fox farming has also brought about the attempt to breed in captivity some of the less valuable fur-bearers, such as the mink, raccoon, and skunk. Of late years the value of skunk fur has steadily increased until now the sale of that fur brings into the United States about three million dollars each year. The numbers sold in London jumped from 426,610 in 1899 to over 2,000,000 in 1911. Prime skins at the present time bring from $1.50 to $3.50. It is believed that the prices will increase rather than decrease.

The 1915 price list from Funston Brothers & Company, a large fur house in St. Louis, shows that the prices paid for the more valuable furs have been greatly reduced. The prices paid for black and silver fox skins were $800 to $1,000 in 1914, but are only $400 to $600 in 1915. The prices for mink, fisher, marten and coyote skins have been reduced about one half. This marked reduction is attributed to the war and will, no doubt, be for a limited time only. When the war is over and the European markets again open there will doubtless follow just as sudden an increase in prices.

There seems to be little danger that the fur-farming industry will fail to be a permanent one. Not only is fur farming an attractive and interesting occupation but it will continue to be remunerative. In spite of the past year, when the period of financial stringency would naturally react most seriously on such a luxury as furs, the price of furs has increased instead of decreased. This has been also in spite of the fact that, in 1913, two or three firms in Leipsic, Germany, failed and threw upon the market at reduced prices $4,000,000 worth of furs. Mr. J. Walter Jones, who has carefully investigated the fur-farming industry in Canada, reports that there are not more than 1,600 silver foxes in captivity in the world. Probably the world's yearly production of real silver fox skins does not exceed five thousand. Fur dealers maintain that silver fox skins will never sell for less than $100 each, and since the rate of increase of silver foxes in captivity is only about one hundred per cent yearly, it appears that at least the farming of foxes will continue to be profitable. Another reason why fur farming will doubtless continue to be profitable is because a better grade of fur is obtained. Ranch bred stock are animals improved by domestication, and being killed carefully and at exactly the right time, the fur is prime and the skins are never torn or injured.

The United States Biological Survey is now carrying on experiments in breeding fur-bearers. Two stations are maintained, one at Prichard, Idaho, and the other at the National Zoological Park, in Washington,

D. C. Those interested will be able to profit by the results of these experiments.

We have long had laws to protect our fish and game but the fur-bearers have been entirely neglected. Meanwhile they are disappearing so fast that the danger point has been reached. Attention to this resource is highly necessary at this time, both because of economic reasons and because there is danger of its passing beyond our control through its entire extinction. The fur-bearing mammals can be made to pay a large dividend if the capital stock of breeding animals is increased.

In most of the provinces of Canada, and in many of the eastern states, all of the more important fur-bearing mammals are protected during the summer season, when their fur is of practically no value.

Fig. 14.—Skins of fur-bearers obtained on a hunt with dogs near Martin's Ferry, Humboldt County.

The open season is usually limited to five months—November 1st to April 1st. In many places a license has to be procured before fur-bearers can be trapped. In Canada the demand for live animals for breeding purposes has become so great that laws have been passed prohibiting the hunting of fur-bearing animals during the breeding season.

Each state as it has attempted to protect the fur-bearers has been confronted with difficulty, for many of the fur-bearing mammals are predatory and their depredations on domesticated animals and birds are in many cases serious. In most instances trouble has been avoided by providing that animals found destroying poultry and live stock could be killed. In many cases where depredations are reported the rancher himself is to blame for not better protecting his poultry and farm animals and as people come to a knowledge of the value of fur-bearers as a national resource there will be more interest in their preservation.

In eastern states the protection afforded fur-bearing mammals appears to be effectual and adequate. In many places where beavers

have been protected for a number of years an increase is to be noted. California should investigate the success obtained in other states and should profit by their experience.

A state trapper's license is very desirable for two reasons: First, it eliminates the man who traps for the fun of it, and who is not interested in preserving the furs; and, second, it furnishes information as to the number of trappers and the amount of trapping done. The latter is particularly important in furnishing data on which to base further protective legislation.

In the beginning of this paper a glimpse of the early fur trade in California was given so as to afford a comparison with conditions at the present time which are fairly well known by everyone. There followed statements which showed the extent of the world's fur trade, and then, possible methods which could be employed to develop the fur industry in California by conserving the fur-bearers. In conclusion, the urgent necessity for early attention to the problem of conserving the fur-bearers should be emphasized. Now is the time to better conditions, not after it is too late. It has taken millions of years to produce the animals which we have now and yet we sweep them out of existence in a hundred years, or less. Man is able to create great industries which become a resource to a country, but where is the man or the group of men that can create a resource that compares in the slightest degree to any of the great natural resources? Man-made creations are capable of restoration but an extinct form of life can never be restored. In this ethical viewpoint we perhaps find the strongest argument of all. But add to this the economic viewpoint and we have an argument in favor of wild life conservation that defies every assailant. Will the people of California heed the handwriting on the wall and properly discharge their duty to the wild life itself, to their state, and to humanity?

Summary.

A casual investigation has shown that there has been a large decrease in the number of fur-bearing mammals in California. This decrease becomes very apparent on comparing the present status of these animals with that of the past. In the early history of California there is much which relates to the abundance and great money value of the fur-bearers. History shows that several companies were formed and many expeditions undertaken in order to develop the fur trade. From 1800 to 1812 a number of American ships annually visited the California coast, trading cloth, muskets, and other material for skins. The toll taken of such valuable fur-bearers as the fur seal, sea otter, and beaver led to their practical extermination. The fur trade in this state began to decline about 1820, but the Hudson's Bay Company kept up their trade until about 1840. Since that time the procuring of fur has been limited to trappers in the mountain districts. The time has now come when several of the fur-bearers need absolute protection; others need to be protected during the breeding season, and still others during the time when their fur is of no value.

We have long had laws to protect our fish and game but the fur-bearers have been entirely neglected. Meanwhile they are disappearing so fast that the danger point is reached. Attention to this resource is highly necessary at this time, both because of economic reasons and

because there is danger of its passing beyond our control through its entire extermination. Two methods of conserving the fur-bearers are possible and practicable. Several species can be conserved by rearing them on fur farms, thus allowing a monetary harvest to be reaped. The remnant which is left in the wild can be made to hold its own and to increase by giving the mammals proper protection by law. Both of these methods are being employed with success in other parts of the United States. California must fall in line and protect fur-bearing mammals if she desires to conserve this asset to the state and make it a source of income and a heritage to pass on to future generations.

Literature Cited.

BANCROFT, H. H.
1884a. History of Northwest Coast (A. L. Bancroft & Sons, San Francisco), 1, xvi, 1–703, maps in text.
1884b. History of Northwest Coast, 2, xiv, 1–712, maps.
1884c. History of California (A. L. Bancroft & Sons, San Francisco), 1, lxxxviii, 1–744, maps in text.
1885a. History of California (A. L. Bancroft & Sons, San Francisco), 2, xvi, 1–795, maps in text.
1885b. History of California (A. L. Bancroft & Sons, San Francisco), 3, xv, 1–792, maps in text.
1886. History of California (A. L. Bancroft & Sons, San Francisco), 4, xv, 1–768, maps in text.

BRASS, E.
1911. Aus dem Reiche der Pelze (Neuen Pelzewaren Zeitung, Berlin), xxi, 1–709, many figures in text.

CHITTENDEN, H. M.
1902. The American fur trade of the far west (F. P. Harper, N. Y.), 3 vols., xxiv, 1–1029, map and illustrations.

COLTON, W.
1850. Three years in California (A. S. Barnes & Co., Cincinnati), 1–456, 6 illus.

COMAN, KATHARINE.
1912. Economic beginnings of the far west (The Macmillan Company, N. Y.), Vol. 1, xix, 418, 16 maps, 29 figs.; Vol. 2, ix, 450, 16 maps, 30 figs. In text.

COMMISSION OF CONSERVATION OF CANADA.
1914. Report of the fifth annual meeting held at Ottawa, January 20–21, 1914 (The Bryant Press, Toronto), x, 1–287, many figs. in text.

HITTELL, T. H.
1885a. History of California (Pac. Press Pub. House and Occidental Pub. Co., San Francisco), 1, 1–760.
1885b. History of California (Pac. Press Pub. House and Occidental Pub. Co., (San Francisco), 2, 1–823.

LAUMAN, J. H.
1840. The American fur trade. Hunt's Merchants' Magazine and Commercial Review, Sept., 1840, 3, 185–204.

NEWBERRY, J. S.
1857. Report upon the zoology of the route, Pacific R. R. Rep., 6, 35–110, 5 pls.

RICHMAN, I. B.
1911. California under Spain and Mexico (Houghton, Mifflin Co., New York), xvi, 541, 10 maps, 7 charts and plans.

ROBERTS, J. H.
1891. Colusa County: * * * its history, with a description of its resources (Orland, California), viii, 1–473.

SETON, E. T.
1909. Life histories of northern animals (Chas. Scribner's Sons, New York), 2 vols., xxx, 1267, 46 pls., 182 figs., 38 maps.

SMYTHE, W. E.
1907. History of San Diego (The History Co., San Diego), 1–736, illus.

TAYLOR, W. P.
1913. Fur-bearing mammals: an unappreciated natural resource, Science, 37, 485–487.

VENEGAS, MIGUEL.
1759. A natural and civil history of California, 2 vols., 455 and 387 pages, 3 pls.

WELLS, H. L. AND CHAMBERS, W. L.
1882. History of Butte County, California (H. L. Wells, San Francisco), 1, 1–305, illus.

WARDENS AND WARDEN WORK.*

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Assistant In Charge Game Preservation, United States Department of Agriculture.

It is a pleasure to me to meet the wardens. While it is some years since I have been in Vermont, I feel that I am not entirely a stranger to this state, or its conditions.

During the past three months I have had an opportunity to meet and compare something like 500 wardens, or would-be wardens in different parts of the United States, and I believe that I have examined orally not less than 200 men who were already in state service, or who aspired to such positions. It occurred to me that it might interest you to know what is required of wardens in different parts of the country, and also what is being done to raise the standard of warden work in the various parts of the United States.

So far as I am aware there are no foreign countries, with possibly a few exceptions, that have any officers like our wardens. Canada has officers usually known as game guardians or game protectors, whose duties are somewhat similar; Australia has officers known as rangers, who look after her game; and in some British colonies of South Africa there are officers whose duties correspond somewhat with those of wardens in the various states. Neither in England, nor in Scotland, so far as I can learn, are there any such officers, and the work of looking after the game falls largely on the employees of private estates, the gamekeepers. In Germany the work devolves very largely upon forestry officers, who besides being wardens are required to do regular forestry work. Somewhat the same conditions prevail in Hungary and in Austria.

The warden service in the United States is very largely an institution peculiar to this country, and it behooves us not only to know what is being done, but to keep in touch with the advances made in this work. Not long ago, in one of the examinations, in the middle west, I asked one of the candidates what was his idea of a warden. (This man was not yet in the service, but hoped to be.) He replied, "I know what a warden is. He's a man that wears diamonds in his shirt front and draws his salary!" In some sections of the country this has probably been true of wardens. In some states a warden's position has been looked upon as a last resort. A man who was out of a job, or was unable to get work, or who had failed in different callings, could always get an appointment as a warden. Naturally the pay for such work was not always satisfactory, to the state, to the people, or, in many cases, to the wardens themselves.

In order that we may meet on common ground, let me say that I distinguish very carefully between warden work as a job and warden work as a profession. If you are serving the state of Vermont merely for the pay, and have no other motive, you had better quit at once, both for your own sakes and for the sake of the state. But if you are in the service of the state to protect its game, to assist in the management of the great natural resources of the state for the benefit of the

*Address delivered at the Second Annual Convention of the Sportsmen of Vermont, March 4 and 5, 1914.

public, and for the benefit of coming generations, then certainly you are worthy of your hire and are engaged in a noble profession.

Not many years ago there was no provision for the payment of wardens in any of the states. They were supposed to secure what recompense they could from a portion of the fines for violation against the game laws. The "moiety system," so called, has never been a success in any of the states where it has been tried—it was merely a first step. Then provision was made for paying salaries at so much per day or per month, but these salaries were small. A warden was not supposed to be worth as much as a common laborer. Salaries of $30 or $50 a month were regarded as ample for the arduous duty of protecting the game and risking a man's life in enforcing the laws. Later on, more onerous duties were imposed, more was expected of the wardens, and in some cases fairly respectable salaries were provided. Today, speaking generally, wardens' salaries range from $60 a month, or $2.00 a day (fortunately very few states pay as little as that but usually at least $75.00 a month, or $2.50 a day), up to $125 a month or $1,500 a year.

Among the things which we are looking forward to, to make warden work a profession and not a job, are:

1. Stability of compensation so that a man can count on receiving a regular salary.

2. A living wage.

3. Reasonable opportunity for promotion, when a man has attained increased efficiency and experience; and,

4. Retirement on a reduced salary (as in Massachusetts), when a man has served the state for a number of years.

Stability of compensation is important to obtain good service. A man can not be expected to work one day for the state and the next day for a private employer, and give good service to both. Neither can a warden be expected to give good service to the state for a less wage than a man receives for digging a ditch in the street. Warden work, under modern standards, requires a high degree of intelligence and a good many qualities which can not be had for nothing. Even with these things we can not get the best results if a man has nothing to look forward to after ten years' service except a number of enemies, the enmity of his neighbors and the possibility of being shot while in discharge of his duty.

Let me tell you in a few words what some states are doing to secure the best results in warden service. In the first place, to get the best men, five states have what is known as a "civil service" law. This is nothing more than the application of the merit system to appointments for warden work. A civil service law does not make good wardens, it simply sifts out the fit from the unfit. New York was the first state to apply the merit system to the game warden service by the ordinary test of a written examination as a prerequisite to appointment.

Wisconsin went a step farther and required not only a written examination, but an oral examination and certain physical tests. Every candidate for the position of warden reads the game law and if he has a retentive memory and is reasonably bright he can easily learn the various open and closed seasons, etc., but he may have had no experience in the field and may know nothing about the application of the law.

An oral examination brings out those facts. A warden may tell you about trapping, how to handle a gun, or how to handle a boat, but take him out in the woods or on the water and you will soon see whether he is repeating something he has learned or whether he has had actual experience. Consequently in some states the physical test is considered very important.

Recently the medical test has been added also. In New Jersey this test is severe because warden work in that state is hard and rather dangerous, and as there are many applicants there is no reason why any man should be appointed who is not absolutely sound physically. Wardens are required to undergo the same tests for strength and endurance as applicants for the positions of firemen and policemen, and then to take some tests especially applicable to the warden service.

Without going into too much detail let me describe the examination for deputy wardens held in Illinois last December. Sixty positions were to be filled, and the salary, $100 a month and expenses, was evidently attractive, for there were 359 applicants, or an average of six candidates for each place. The examinations were held in the armory at the state capital, Springfield. The candidates were required (1) to give brief statements of their experience, (2) to tell something of their education, and (3) to answer ten questions on the game law and warden's duties. While some were writing out answers to questions, others were formed in line around the room, and were examined as to their physical condition. The services of seven physicians were required for this part of the examination. Stepping up to the first physician each candidate was measured and weighed; a few steps beyond he found another physician who sounded his heart and lungs; a little farther on another who tested his eyesight and hearing, and so on. After the men had finished their written and medical examinations they were taken upstairs to the state museum and passed in line in front of a series of cases in which were arranged thirty or thirty-five mounted specimens of common birds, fish and game. They were given one minute in front of each case to identify at sight the fish or birds which they were required to protect. They were then given an oral interview separately of three to ten minutes as to their general knowledge of conditions in the state, the protection of game, and warden's duties. The examination lasted from 9 in the morning until 10 at night—not continuously for each man, but it required thirteen hours to handle the whole number of candidates.

The next day some of the men were taken out into the field and examined in handling a gun, in running a motor, and in various other outdoor tests. On the basis of this examination appointments were made to the sixty positions, and under the civil service law of Illinois only the highest man can be certified for a position. As the examination was required both of wardens already in the service who were holding temporary positions and those outside the service who wanted to be wardens, it was necessary for a warden who wished to hold his position not only to take the test, but to stand at the head of the list.

Two months later, in February, a second examination was held for the position of district warden, corresponding somewhat to that of county warden in Vermont. The chief duty of the district warden is to supervise the work of the local deputies and his salary is $1,500 a year. There were six positions to be filled, and sixty-six candidates, or

eleven applicants for each position. The examination was much the same as that for the deputies, except that it was much more severe. Among the questions asked were questions of policy, regarding the handling of men, how to distribute wardens to secure the best enforcement of the law, how to work out certain problems in different parts of the state, etc. These Illinois examinations were the largest of the kind ever held in this country for the purpose of selecting men to serve as wardens.

Three weeks ago it was my privilege to attend the warden's school in Wisconsin, which lasted three days. Wisconsin has gone a step farther than some of the states in providing promotion for men who perform their work satisfactorily and pass a suitable examination. The first step is to grade the men. Those who enter the service as protective wardens receive $2 50 a day, or $75 a month; those who elect to enter the service for what is called "outlying fishing" work, which consists of looking after the commercial fisheries on Lake Superior and Lake Michigan, get $3 a day, or $90 a month; and those who wish to enter transportation work, inspecting the shipment of game or fish, also receive $3 a day, or $90 a month.

Last summer the state warden inaugurated a correspondence school for wardens. On the first of each month he sent each of his men five questions which the deputies were requested to look over and answer to the best of their ability. Failure to return the answers counted on the record. The warden then sent out copies of the correct answers and each deputy was asked to compare them with his own. The fifth month the state warden invited the deputies to submit five questions which they would like to ask relative to the game laws. Instead of attempting to answer them, he brought this collection of several hundred questions to the annual convention and had the men discuss them, and in this way thoroughly covered the ground by a general consideration of the more practical questions which arise in the state.

Each year the state assembles the deputies and holds a promotion examination, open to those who have been in the service more than six months. Each man with a satisfactory efficiency record, who attains the requisite marks on the examination is entitled to a liberal promotion. Every man is anxious to secure a promotion and every member is on hand, ready to do his best. A man's record for the year counts 50, the written examination counts 30; and the oral interview counts 20 per cent. The efficiency record does not depend upon the number of arrests made but is divided into five parts, of which the number of arrests and convictions is only one, and in some cases a very small part. A good deal of prominence is given to the success of a deputy in building up sentiment in his community in favor of fish and game conservation, for the law of Wisconsin requires the warden to instruct the public as to the protection of fish and game. Another thing that counts is prompt and efficient service, and still another is promptness and care in making out reports.

The men that brought in the largest number of arrests were subjected to very careful scrutiny in the oral examination, and it soon developed that this was a very uncertain basis for promotion. Many men, thinking that the number of arrests was the test that counted, had evidently been looking for all sorts of minor offenses, many of them doubtful

cases and none of them particularly difficult. Others had given all their attention to minor fishing cases (although the only support for the warden service was derived from the receipts from hunting licenses) and a few had given attention to difficult cases, such as dynamiting fish, or detecting illegal shipments of fish or game. As a result the number of arrests, in many cases, proved disappointing to the men themselves, because they found that quality rather than quantity of work counted in making up the record.

On the basis of the promotion examination every deputy in Wisconsin who passes successfully may receive an increase of fifty cents per day, which will amount to nearly $200 a year and he may be promoted from $900, the lowest salary, as high as $1,400 a year.

New York also has a system of promotion, but the increase in salary is $100 a year. The examination is not open to the entire department, but only to those men who have attained a certain grade in their efficiency record during the year.

The civil service conditions that have been mentioned are required by law in six states—New York, New Jersey, Wisconsin, Illinois, and recently in California and Massachusetts. They have been adopted as the policy of the game commission in Delaware and are likely to be introduced as the policy of the commission in Michigan and Kentucky. When Delaware passed a hunting license law and received a fund sufficient to pay regular salaries to wardens, the game commission insisted that a written examination was first to be held for the position of chief warden. As soon as the chief warden had been appointed he was instructed to confer with the department of agriculture and prepare an examination made up of written, oral and outdoor tests suitable for deputies. When the appointment of the deputies had been made the commission secured the services of two experienced game protectors from another state to work for a few weeks with the new men so that Delaware has had good service from the very first and has secured some very surprising results.

So much for the methods of selecting wardens. Massachusetts, as already stated, has gone a step farther and has provided that its officers, including wardens, who have served for fifteen years, may retire on a certain percentage of their salary. In other words, the state treats its wardens as some large railroads and other business concerns treat their employees. The time may come when other states will follow this example, but at present Massachusetts is the only one that has taken this decisive step.

Turning for a moment from the warden to his superior, let us see how conditions have changed in recent years. Not many years ago the state warden, or commissioner, in one of the western states was called in by the governor, who was about to prepare his message to the legislature, and was notified that unless he could find some way of making his department self-supporting the governor would be obliged to recommend the abolishment of fish and game warden work. The warden submitted a plan for a hunting license system, which was adopted at the next session of the legislature, and from that day to this the service in that state has been self-supporting. The game department is now self-supporting in about half of the forty-four states that have game commissions—chiefly through the income from hunting licenses.

Recently Prof. T. S. Adams, of the tax commission of Wisconsin, in a public address on taxation, declared: "The game warden department of Wisconsin is paying dividends to the state." That department is not supported by ordinary appropriations; it has never cost the taxpayers of the state a dollar for the protection of game, and last year, after paying all expenses, it had a surplus of about $60,000. A commissioner who can handle his department and make it a revenue producer for the state is entitled to reasonable compensation. So it has come about that while a few years ago $1,000 was considered a reasonable salary for a commissioner, considerably larger salaries are now paid in some states. In New York $10,000 is paid to each of the three members of the conservation commission; several states pay from $3,000 to $5,000, and a majority of them now pay $2,000 or more. In some states the warden is not only a police officer, whose chief duty is to enforce the game laws, but he must be skilled in game propagation, just as he is supposed in some states to be skilled in fish propagation; and he may be required also to assist in forestry work, if necessary; to aid in fire warden work, or to take part in educational work.

Let me digress a moment to speak of some of the duties of federal wardens who are called on to do a variety of things. We have some wardens who are in charge of the national bird reserves (of which there are now sixty-four) to see that the birds are not molested during the breeding season. We have wardens whose duty it is to take care of big game, especially buffalo and elk, on some of the game preserves of the west; and we have wardens whose duty it is to feed the elk. In Wyoming we feed sometimes as many as 7,000 elk, feeding each winter from 500 to 700 tons of hay. It is also the duty of some of the wardens to accompany and care for the shipments of elk made to different states for the purpose of establishing new herds. Finally, we have men cooperating with state officers in the protection of migratory birds and in the enforcement of the laws regulating interstate commerce in game.

The warden of today must be an all around state officer, familiar with his territory, familiar with the habits and haunts of the various kinds of birds, game and fish under his protection, and familiar with the people in the community. He must be in touch with conditions elsewhere, must keep informed as to new inventions for hunting, improvements in firearms; new devices for outwitting the game laws, and novel plans for game conservation, so that when called upon to express an opinion as to what is necessary to meet certain conditions, he may at least know what is being done in other states in the enforcement of the fish and game laws. New problems are rising fast, but unless a warden is familiar with them he is not earning his salary. To meet this difficulty some of the states, like Vermont, have established annual conventions for the purpose of bringing the wardens together to compare notes, to get acquainted with each other and to learn what is being done in this and other states in the various lines of conservation work.

I have gone over these points hurriedly to call attention to the steady progress in the administrative part of warden work; to let you know that progress is being made in recognizing the value of warden service through fair salaries, and the hope of still better salaries through pro-

motion. The one thing I want to impress on you is, that in order to succeed, a warden must regard his work as a profession, must realize that it demands unremitting attention and study, and that it is essential for him to keep fully abreast of the times.

THE TENNESSEE POSSUM HAS ARRIVED IN CALIFORNIA.

By Joseph Grinnell.

Contribution from the Museum of Vertebrate Zoology, University of California.

On February 25, 1914, there were received at the Museum of Vertebrate Zoology of the University of California two live possums (*Didelphis virginiana* of scientific parlance) (see fig 29). These were kept alive at the museum a few days and then killed and preserved as scientific specimens, these now bearing the museum numbers 20799 and 20800.

The circumstance of particular interest was that the animals were captured wild here in California, where possums were never known to have been native. They were secured and sent to us by Deputy Fish

Fig. 29.—A Tennessee possum caught near San Jose in February, 1914. This animal is becoming well established in Santa Clara County, where several escaped from captivity about four years ago.

and Game Commissioner I. L. Koppel, of San Jose. The exact locality of capture was on the Wade Ranch on the banks of the Guadalupe Creek, near Agnew, Santa Clara County, where they were taken February 5 and 23, 1914.

At our request, Mr. Koppel has made extensive inquiries in regard to the occurrence of possums in the vicinity of San Jose. According to Mr. Koppel's findings there have been at least two cases of importation and liberation, both "about four years ago." Mr. J. R. Kocher, a jeweler in San Jose, residing at Tenth and San Antonio streets, imported seven from Jackson County, Tennessee. Two of these got away at his residence; the other five he sent to a negro caterer in San Jose, by the name of Jake Overton. These were kept in a coop at 856

South Eighth street, San Jose, until three "got out," making five that got away out of this one shipment.

Another party is reported to have more recently had shipped to him another lot of possums, about three of which are rumored to have gotten loose. At any rate, we are safe in assuming that the initial introduction took place early in the year 1910.

Up to the end of 1913 possums to the number of fully 100 have been reported as captured, thus many more than can be accounted for as liberated. Ten, at least, of these have been caught in San Jose alone. Others have been found in various parts of Santa Clara County from Sunnyvale to Wrights and Gilroy. On Guadalupe and Coyote creeks tracks have been seen of families of a dozen each. A male was caught down along the creek at Wrights Station. About January 20th three were caught with dogs along the creek at the same place. About March, 1913, at the Standard Oil Company's plant at San Jose, near Los Gatos Creek, a large female was killed, with eight young in her pouch. The young were raised on milk. A male was caught later in the same locality.

Of the two possums sent to the museum, the large male was found on a stump the day before it was shipped. The female was caught in a brush pile previously.

About September 1, 1914, Manuel Silva, on the McClay Ranch, near Evergreen, caught a female that had seven young, about the size of gophers in her pouch. On the S. F. Patton Ranch, on the Mt. Hamilton road, a possum was poisoned recently, and dogs caught another one near by.

Information received on September 23, 1914, is to the effect that on the Wade Ranch, on the Alviso road near Agnew, a female possum was captured by Mr. Wade and given to Mr. Farry of Agnew, where some twelve days later she became the mother of ten beautiful young, two of which, at the present time, are sojourning at the state game farm.

On October 5, 1914, on the George Fiehman Ranch near Milpitas, a fox terrier caught two possums about one fourth grown; and on October 8, 1914, the dog caught three more about one half grown, showing that at least two litters were represented. These five possums, together with two procured from Mr. Farry of Agnew, were sent by Mr. Koppel to Superintendent W. N. Dirks, at the state game farm at Hayward. On October 20, 1914, Mr. Koppel caught a large male possum on the George Fiehman place and shipped it at once to the game farm. This possum was as large as Fiehman's dog. All together, at least nineteen have been caught on the Fiehman ranch.

It is reported by Mr. Koppel that five of the possums got away at the game farm on October 13th.

It is believed that fully two hundred possums are accounted for to the present date as killed or captured, and in spite of this, the species appears to be spreading and multiplying at a rapid rate.

It would appear that the possum has found in this part of California congenial climatic conditions, at least sufficiently near those of its native habitat in the southeastern United States so that it is thriving. It is rather doubtful if we are to consider ourselves lucky in having acquired this addition to our mammal fauna. In fact, it is quite possible that we may live to greatly regret the circumstances which secured its introduction into our state.

The following account abbreviated from Rhoads (1903) will give a vivid idea of what we may expect of the animal:

The possum spends the day in hollow trees, logs, deserted burrows of other animals, drains, sewers, brush piles, hay stacks, and outbuildings. It prowls abroad at night, foraging for fruit, nuts, eggs, birds, and rodents, reptiles and insects. When other food is scarce it eats carrion, and may even become a cannibal. It lives and multiplies in thickly settled regions, this doubtless because of its omnivorous diet, its fecundity, its habit of "playing possum," and its nocturnal habits.

The birth rate of the possum is marvelous. As many as sixteen young are produced at a time; at birth they are three fourths of an inch long, naked, and with rudimentary hind limbs. Each youngster is securely attached to a teat within the abdominal pouch of the mother. From this pouch they emerge when about the size of small rats, and cling by tail and feet to the body of the parent. There are said to be as many as three litters per year.

The fondness of the possum for fruit, eggs and poultry can scarcely be offset by the facts that some people consider it good to eat and that it is somewhat of a scavenger and destroyer of vermin. Its over-abundance, however, may be checked by trapping, and it is not likely that the possum will spread far beyond the thickly settled parts of the state where it can find a living around orchards, gardens and barns.

It will be extremely interesting to watch the history of this, our latest immigrant.—*Museum of Vertebrate Zoology, University of California, Berkeley, October 26, 1914.*

THE HALIBUT FISHERY OF THE PACIFIC COAST.*

By Edward P. Rankin,

General Assistant, Scientific Department, U. S. S. Albatross.

The purpose of this paper is to present a brief description of the gear and the methods used by halibut fishermen; in it are set forth a few observations, made throughout the halibut investigation, which was conducted off the coast of Oregon by the United States Bureau of Fisheries, during part of April, May, June, July, August and September, 1914. The work was carried on, part of the time from the fisheries steamer *Albatross*, on which expert fishermen were employed; and part of the time from Newport, Oregon; consequently, the methods have been viewed from all sides. The information here given regarding the fisheries is the result, both of actual fishing operations in which the writer took part, and of interviews with skippers and fishermen of various halibut boats.

Hippoglossus hippoglossus, the common halibut, is a member of the flounder family, and one of the most valuable of food fishes; its body is extremely flattened from side to side, oval in outline, almost white on the lower side, and dark gray or grayish-brown on the upper side. In this connection, it must be remembered that this fish swims on its side; in consequence, its back and its belly are in the same horizontal plane. This is all due to the distortion of the head, because of which both eyes are situated on the same side, the "blind" side being the lower. The very young halibut has the appearance normal to other

*Printed with permission of U. S. Bureau of Fisheries.

fishes and swims on its belly; but soon the skull becomes so twisted, as to bring the two eyes on the same side—usually the right; from that time on, the fish assumes the horizontal position. The mouth, armed with strong teeth, is small in proportion to the size of the body as compared with most other fishes, but it is proportionally large in comparison with other flounders.

In point of size, the halibut is one of the largest fishes, ranking with the swordfish, the tarpon and the tuna. Specimens weighing four hundred pounds, or more, have been taken, but they are not commonly seen. Jordan and Evermann, in "American Food and Game Fishes" (1905, p. 524), mention that "Nilsson records one from the coast of Sweden that weighed 720 pounds." A fish weighing between eighty and one hundred pounds measures nearly five feet in length; its "depth," *i. e.*, the distance from back to belly, is about one third of its length. A fish that has attained a weight of three hundred pounds is about seven feet long, and perhaps three feet deep.

It has not yet been learned when spawning occurs, nor is it known under what conditions this takes place. On September 1, 1914, in a female halibut caught on the *Albatross'* gear, the eggs were looser, somewhat larger, and seemingly more nearly approaching "ripeness" than was the case in any female halibut previously taken during the investigation. Apparently, the time for spawning was approaching, but the evidence is too slight to form the basis for any theory.

Concerning the food of the halibut, little is known, for the reason that eight or nine tenths of those caught are found to have disgorged the stomach contents. Some evidence, bearing on this question, was obtained as a small result of the investigation. Strictly carnivorous, the fish has a varied diet, sometimes exhibiting positively cannibalistic tendencies. In the stomach of one halibut was found a starfish; another contained a small octopus; while from still a third one, a young ray was removed; crustaceans, such as shrimps, are also indulged in at times. But fishes, of various kinds and sizes, seem to constitute the bulk of the halibut's food. A small halibut, partly digested, was found in a larger one; and in each of several halibut were the bony remains of fish which must have been somewhat of a "mouthful" for the captor. One halibut, in particular, weighing about 130 pounds, contained, all at the same time, a hake (*Merluccius productus*), a silver salmon (*Oncorhynchus kisutch*), and a red rock-fish (*Sebastodes ruberrimus*), the so-called "rock-cod." Each of these fish weighed fully ten pounds, and had been swallowed only a short time before the halibut was caught.

Distinctly an inhabitant of the bottom of the sea, the halibut roams leisurely about, but probably does not remain long in one locality. This is inferred from what fishermen report; that, after they have fished one place for perhaps a day, they are obliged to shift to another location five or ten miles away, because the fish have disappeared from the old ground. Bottom of coarse sand or fine gravel, on which sea-pens and anemones abound, seems to be preferred by the fish, while muddy or barren bottom is either shunned or passed over rapidly. In addition to the character of the bottom and the abundance of food, *temperature* is a factor influencing the wanderings of the halibut; rarely is the fish found in waters warmer than 45° Fahrenheit, but is most commonly taken in waters considerably colder.

Ranging from Behring straits southward as far as the latitude of San Francisco, halibut are, however, found in commercial quantities only from the latitude of central Oregon northward. By far the greatest amount of halibut is taken in the waters of southeastern Alaska; yet not inconsiderable quantities occur in the region of Cape Flattery, Washington, and off Newport, Oregon. Fairly successful fishing is done off Smith river, in the northern part of California.

The boats engaged in the halibut fishery vary greatly in size, from small ones having a cargo capacity of 50,000 pounds to large ones capable of holding 200,000 pounds of halibut. Each boat—unless it is a very small one indeed—carries from two to twelve dories (flat-bottomed rowboats of special design), from which the fishing is done. Among fishermen, the number of dories carried by a boat is used as an indication of her size; thus, "She carries four dories," or "She carries twelve dories." This phrase indicates, also, how many fishermen are employed on a boat, for each dory is manned by two fishermen.

The gear used in fishing for halibut consists of lines, set with hooks, which are allowed to lie on the ocean bottom. These are called the "ground line." Each line is about 225 feet in length; seven or eight of them, fastened end-to-end, constitute a "skate" of gear, which has a total length of nearly 1,600 feet—almost one third of a mile. To the ground line are fastened, or "bent," short lines, called "gangings" or "gangions," at intervals of about nine feet; each gangion is five or six feet long and has a hook attached to its free end. Hence, there are about twenty-five hooks to a line; and a complete skate, of eight lines, will have two hundred hooks.

For bait, fresh salmon is said to be particularly desirable. Since this can not always be readily obtained, the fishermen have various substitutes for it. Frozen fresh herring is frequently used; and, as a last resort, salt herring. If a boat's supply of bait becomes exhausted, the men resort to the expedient of cutting up, and baiting the hooks with fish other than halibut which have been taken on the lines. Red rockfish (*Sebastodes* sp.), "black cod" (*Anoplopoma fimbria*), and "ling cod" (*Ophiodon elongatus*) all serve as this emergency bait, which is technically known as "gurry." Oddly enough, neither halibut flesh nor ray flesh, when it is used for bait, is taken by the halibut!

When the boat has arrived on the fishing banks, soundings are made until favorable bottom is located; a small sample of the bottom is picked up by soft soap or tallow in the lower surface of the sounding lead. Meanwhile, the gear is baited, and everything made ready for a "set." Frequently a trial set is made, to determine the prospects for a good haul; one skate of gear is usually put down and allowed to lie for a couple of hours. If the results of this are good, the other dories are lowered; if they are not good, the boat's berth is shifted and reshifted until a favorable fishing place is located.

In "setting" a skate of gear for fishing, the procedure is as follows: To a small keg, which serves as a buoy, is attached one end of a long line, the buoy line, whose length depends on the depth of the water; the keg is then thrown overboard, and the line is allowed to run out. The other end of the buoy line is "bent on" to a small anchor, to which one end of the ground line is also bent. Being put overboard, the anchor sinks to the bottom, carrying down with it the ground line. Then, while one man slowly rows the dory in a direction previously

determined on, the other throws out the gear, a few feet at a time. When the end of the line is reached, the line is hauled taut for a few seconds in order to make it lie straight on the bottom of the ocean. An anchor is bent on and, with a buoy line attached, is lowered to the bottom; a buoy, fastened to this second buoy line, is heaved overboard. This act completes the setting of the gear. For any but trial sets, generally three skates of gear, or, not infrequently, more than that, to a dory, are used. In that event they are usually fastened end-to-end, although occasionally they are set separately.

The gear is allowed to remain down—to "soak" is the technical term—for at least two hours; but a "soak" of three or four hours is advocated by many fishermen. The length of time is regulated somewhat by the kind of bait used; fresh herring is not left down much over an hour and a half, because it tears off easily; salt herring is given a soak of three, four, or even six, hours, to allow time for the salt to dissolve out of it; fresh salmon will stand a three-hour soak well. However, no definite rules can be laid down, and each fisherman is guided by circumstances and by his own experience. At the end of the alloted time, one man busies himself with hauling in the line; the other disentangles any snarls, removes fish and bait from the hooks, and coils down the line in the dory. This done, the boat is signaled for; she having come alongside, the fish are taken aboard in a sling, and then the dory is hoisted. All hands immediately turn-to, to dress the fish, which are iced down in the hold. A catch of 500 pounds of halibut to the dory is considered "good fishing."

When ten or twelve dories are operated, they are spaced from half a mile to a mile apart, and the lines are set parallel to each other. Consequently, a considerable area of ground is fished over. It is estimated that, in one "set," a boat running twelve dories can cover thirty-six square miles of fishing ground. And commonly two sets are made in a day.

Several trips are made during the season, which, because of the severe winter storms, lasts only from spring to early fall. Operations are continued, either until the boat contains all the fish she can carry, or until supplies are needed; thereupon the boat returns to port and disposes of her catch, which is either distributed to local dealers, or shipped in ice to more distant markets.

PUBLIC FISHING vs. PRIVATE HUNTING.

By F. M. Newmire, President California Fish and Game Commission.

The state legislature, in 1911, enacted section 4085½ of the Political Code, which grants to the county boards of supervisors the right to condemn a public highway for the purpose of fishing along the banks of any stream stocked by the state which does not run through cultivated land. Prior to the passage of this act there was much determined opposition offered to the bill by certain people who held that such a law would have the effect of breaking down the powerful trespass law in force in the state. It was also argued that the bill meant confiscation of property rights and was in direct conflict with the constitution. However, the bill was passed and signed by the governor.

In this act there is no confiscation of property without just remuneration. The county must purchase such a right of way after due process of condemnation. Further, the people of this state have been taxed from 1871 to 1909 for the upkeep of the hatcheries and for the importation and distribution of valuable food fishes. It is estimated, on reliable authority, that fully 95 per cent of the fish now in our streams are the result of the work of the Fish Commission in the importation, artificial propagation, and distribution of fish. Since the people have had to pay for the hatching and distribution of practically all the fish in the streams, it certainly follows that they should have the sole and exclusive right to partake of them, subject to such rules and regulations as they themselves enact into laws through the medium of their representatives. Inasmuch as they have signified their intention to protect property from wanton destruction and to give just remuneration to those whose real estate is needed in the further advance of community interests, it also follows that they may call upon any person to allow free access of the public to the fishing streams they have stocked, and to remunerate him for the loss of the needed part of his estate.

This is certainly just and equitable when the required strip lies wholly upon wild lands not in any manner devoted to agricultural pursuits. In the peaceful entering upon wild lands for the purpose of fishing, the disciple of Isaac Walton carries no more dangerous weapons than his rod, line and hooks. The danger of maiming or otherwise injuring stock is reduced to a minimum, and the loss to the individual through the forfeit of his sole and exclusive right to fish in that stream is nil.

On the other hand, we have the time-worn and vexing question of private game preserves or hunting grounds. The erroneous idea prevailing among some people regarding these institutions is founded upon a lack of information concerning them. The people at large have not taken the time to correctly inform themselves upon this subject. It is claimed that private hunting grounds may be done away with and the self-same argument used in the matter of public fishing is advanced against them. But the positions of the two questions are not analogous in any particular. Can we exercise the right of eminent domain against the private hunting ground, or can we condemn it in the interests of the great mass of hunters, and yet be just and equitable to the owner of the land? We must take into consideration the natural elements entering into the question, and, in so doing, we would commence with the most prominent bone of contention, the "duck club."

The greater portion of duck club grounds furnish the best stock pastures in the state. On the duck-shooting grounds of the Sacramento and San Joaquin valleys you will find more grazing stock to the acre than anywhere in the uplands. While this territory is covered with water the year round it is not flooded merely to make it a rendezvous for the waterfowl. Nature herself is responsible for these immense areas of water. The water is from six inches to two feet in depth over the whole area and you will see stock feeding upon the succulent aquatic grasses and plants that spread their heads above the surface. The whole area is enclosed in a stock-tight, barbed wire

fence to keep the pastured stock from wandering. But when the annual floods come, pasturing is at an end and the duck club becomes a thing of the past.

Now the owner of valuable lowland grazing areas must certainly have the right to utilize those lands for whatever purpose he desires as long as he does not infringe upon the rights of adjoining property owners. If he wishes to prohibit hunting altogether he may post his land according to law, as does the upland owner. The latter certainly does not care to allow indiscriminate hunting by irresponsible hunters and suffer the possible chance of injury to his grazing stock. This upland owner is very desirous of maintaining the law that enables him to keep hunters off his land, yet he raises his voice in anathemas against the "duck clubs." His execrations are born of thoughtlessness. If a law is good for the upland farmer, why is it not good for the lowlander? If this lowland farmer wishes to rent the hunting privileges of his land and to so safeguard his interests that he can hold his lessees responsible for all damage done by them, is it possible to prevent him from so doing?

This lowland farmer leases to a club the sole and exclusive right for them to enter upon his premises for the purpose of hunting. There is written in that lease an iron-clad clause to the effect that the members of the club, jointly and severally, are responsible for any damage accruing to either his real or personal property contained in the premises. Since this owner has granted to a few responsible people the all and exclusive right to hunt thereon, does it follow that he should extend that privilege to every applicant? If such were the law, how would the owner be remunerated for the loss of stock? Could ten days in the county jail for a stock-killer bring back to this outraged owner one thoroughbred animal?

Consider the position of the upland farmer without the protection of the trespass law. We will take, for example, a hunter who goes out to one of these upland ranches wherein stock is pastured. Within an hour he bags the limit of quail. He immediately returns to town and spreads the good news. Can you hazard a guess as to the number of nimrods present upon that ranch the next morning and can you estimate the probable death rate among the cattle caused by those hunters who "thought the calf was a covey of quail just rising?" If we take away the right of the upland farmer to post "NO HUNTING" signs and the protection of the trespass law, no rancher in any game country could keep even so much as a milch cow or a single horse in his pasture. But he enjoys the protection of the same law that prevents indiscriminate hunting upon the property of the lowland farmer.

The erroneous idea of what duck clubs really are has made some people conjure up in their minds a veritable ogre. People who have never thought of them save that "they were a curse to the country" believe they are vast stretches of water and tule of unknown depth with here and there a bleak little island for the hunters to stand upon. They can see, in their mind-picture, attendants busily strewing wheat, rice and other grain over the water to attract the waterfowl which fly over in a sun-obscuring cloud and alight upon the water. They also see the hunters shooting from early morn until

late at night, day after day, while attendants feverishly reload the guns and bring refreshments to the busy shooters. It is a wonder that these people can call this sport, when such grilling work would call for the greatest of hardihood and endurance.

It is not generally known that practically every duck club in this state has written in its by-laws a prohibition against shooting more than two days in any one week during the open season and none at all during the closed season. A violation of this clause or of the bag-limit law will cause a member's expulsion from the club and the forfeit of his membership. The capital he has invested in his membership would, in many instances, cause a considerable personal financial flurry.

Many duck clubs own their own grounds and they, in turn, lease the grazing privileges. Now could we, by any form of law, prohibit these men from owning that property? Could we force them to allow free access to their land to every man with a gun, simply because they themselves hunted there? Is it possible to confiscate that property simply because it is hunted over about two months in the year and grazed the remainder?

Suppose the state appropriated $500,000 for the purchase of duck grounds. When this purchase was consummated who would enjoy this expenditure of the taxpayers' money? Answer: The retired capitalist and the market hunter. Stop and think it over.

OUT-OF-DOORS.

Away from the busy city and the ceaseless clang of the street,
And the piles of brick and mortar and the tramp of hurrying feet;
Away from the crash and clatter and the worrying, wearying strife,
Come, ride with me o'er boundless plains and thrill with the joy of life,
Where blue is the vault of heaven, and the Master that man adores
Is everywhere in Nature, in His own great Out-of-Doors.

The forests sing their welcome; they bid us a moment give,
To come and commune with Nature, and learn what it is to live,
Where, watchful, the mighty mountains eternal vigil keep,
Or where swiftly swirling waters will lull our unrest to sleep;
Where by the evening campfire, "'Tis joy to forget old scores,"
Remembering only that we are men in God's great Out-of-Doors.

Selected.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California.

April 10, 1915.

Everyone owns a share in the natural resources of this state. The protection and conservation of game is, therefore, to the interest of every citizen.

"CONSERVATION THROUGH EDUCATION."

There seems to be no end to the sentiment favoring our motto: "Conservation through education." When the federal bird law was being discussed in congress, Representative Linthicum of Maryland said:

"We should begin a campaign of education, teaching not only the pleasure to be had from a closer acquaintance with our bird friends, but also the benefits which farmers derive from their presence. To many it has never occurred that man is the only living creature who takes life for sport or pleasure; others take life, but when they do so, it is always for food or in self-defense—never for pleasure alone. Legislation alone will never assure that complete protection toward which this measure is a step. Real protection will come through educating our people as to the value of birds, that they may realize the part played by them and other inhabitants of our fields, forests and streams as economic factors in our everyday life. Unless backed by strong public cooperation, legislation will accomplish little."

ORGANIZATIONS DEFENDING WILD LIFE.

The growth of sentiment in favor of wild life conservation is showing itself in a number of ways. One noticeable thing has been the growth of a number of societies having for their object the protection of wild life. Besides such older active organizations as the Cooper Ornithological Club and Audubon Society, there are now four other societies more recently formed whose distinct purpose is to stir up interest and actively work for better wild life conservation. A list of these more recent organizations, with the names and addresses of their presidents and secretaries, is given below.

California State Fish, Game, and Forest Protective League—J. R. Hauer, president, 216 Pine street, San Francisco; J. Sherman Woolf, secretary, Monterey.

California Associated Societies for the Conservation of Wild Life—Dr. William F. Bade, president, 2223 Atherton street, Berkeley; Dr. W. P. Taylor, secretary, Museum of Vertebrate Zoology, Berkeley. Established 1912, composed of many prominent organizations, such as the Sierra Club, California Academy of Sciences and the State Humane Association.

The Wild Life Protective League of America, Department of Southern California—Charles F. Holder, president, 475 Bellefontaine street, Pasadena; Major F. R. Burnham, D.S.O., secretary, Fresno. Established 1914.

California Wild Life Defenders—Henry C. Hall, president, Corte Madera; Harry Harper, secretary, Capitola. Established 1914.

The last-named organization is the latest to take the field. Its secretary, Harry Harper, was formerly secretary of the California State Fish, Game, and Forest Protective League. The motto of this new organization is: "For Our State. For Its Streams and Forests. For Its Song Birds and Flora. For All Its Wild Life—and So, at the Last—For Our State."

The California Federation of Women's Clubs, with 30,000 members in the state, has organized a committee for the conservation of wild life, with Mrs. Harriet Williams Myers as chairman. This shows that the women of California can be depended upon to support wise conservation measures.

All of the above organizations have taken an active part in supporting certain measures relative to fish and game proposed during the last session of the legislature.

IS BIRD PROTECTION WHOLLY SENTIMENTAL?

Many people seem to believe that bird protection is wholly sentimental. Look far enough into the subject and you will find that it is largely economic. The Rockefeller Foundation has just paid $225,000 for 85,000 acres in Louisiana, which is to be used solely as a refuge for migratory birds. Surely there is more than pure sentiment behind such a gift as this.

The property so recently purchased by the Rockefeller Foundation is near Marsh Island, which, in 1912, was secured by Mrs. Russell Sage for the same purpose, and adjoins a 60,000-acre tract which its owner, Mr. E. A. McIlhenney, has devoted to bird protection. When the Foundation carries out its intention of acquiring the nearby land these refuges will become one great bird preserve of 500 squares miles, covering a frontage of seventy-five miles on the Gulf Coast.

CITY PARKS AS GAME REFUGES.

There are three vivid examples in this state of what may be done in the way of bird protection. A visit to Golden Gate Park, San Francisco, Persita Park, Oakland, and Southside Park, Sacramento, will show thousands of water fowl congregated on the lakes in these parks. Even though Lake Merritt, in Oakland, is situated almost in the heart of a great city, the ducks there have become so accustomed to protection that they can be approached within a few feet.

In some places the lakes have been made attractive to wild fowl by keeping pinioned ducks. In Southside Park, Sacramento, a number of pinioned geese are also to be found. Last year Mr. Neal secured some eggs of the wood duck and had them successfully hatched. As a result, this, the most beautiful of all ducks, is to be seen on the lake in Southside Park. Although able to fly, these ducks seem to be well satisfied with their home in a city park.

It takes but a very small body of water to furnish a refuge for water fowl. At the County Infirmary, in Oakland, a large reservoir has been made to teem with water fowl each winter by keeping a few pinioned ducks thereon. (Fig. 30.)

FIG. 30.—Ducks on pond at County Infirmary, Oakland, California. As ducks are protected and fed here, they congregate by the thousands. Photograph by F. C. Clarke.

BREEDING DEER FOR THEIR HORNS

The following extract from a letter by Frank N. Meyer, Agricultural Explorer, Office of Foreign Seed and Plant Introduction, U. S. Department of Agriculture, to his chief, dated Omsk, Siberia, July 17, 1911, which appeared in the *Journal of Heredity* for February, 1915, describes a remarkable industry now thriving in Siberia:

In Biisk we stopped with a farmer who had become a wealthy man through the sale of stag antlers, and saw how the women folks were boiling several magnificent pairs. They were all coated yet with the down, which is an absolute necessity to sell them, as the Chinese take only those which are young. This stag-keeping business has its headquarters in and around Biisk, and by pure accident we had stumbled upon one of the most interesting industries in this world.

It seems that about forty years ago somebody in Biisk made an experiment of keeping some stags in captivity and by sawing the antlers off and bandaging the wounds, showed that a stag can be deantlered and survive the process and be operated upon every year. Up to that time the animals had been hunted until they were well nigh extinct, and the collecting of antlers was a very unsteady sort of business—one never knew whether one would get much or not. Well, the animals multiplied and high-fenced enclosures were established all over the mountains, for these stags need much ground to pasture upon, otherwise they don't remain healthy. And today there are several thousand stags in and around Biisk, and the income derived from the sale of the antlers has made some people very wealthy, for every male animal produces about 70 roubles* worth of antlers every year, and some men have as many as 400 stags. The average price paid for the antlers is between eight and twelve roubles per pound, according to the market.

The antlers are sawed off with a fine saw and weigh, fresh, twice as much as later on. They have to be boiled in salted water and very great care has to be taken that the fell-like covering doesn't come off; therefore, they are boiled several times, and each time allowed to dry out again. When sufficiently cooked, they are hung in the wind and allowed to dry thoroughly, and in that state they are bought up by dealers and said to be exported to China via Mongolia. The Chinese, as you may know, believe thoroughly in the rejuvenating and stimulating power of young deer horns, and the soft, scraped and powdered, forms a valuable ingredient in certain of their medicines. I was also told that a firm in St. Petersburg has taken up this matter and is manufacturing a special medicine from them, under the name of "Spermine."

*A rouble is worth about 51 cents, U. S. currency.

PHEASANT FARMING.

There has recently been published under the direction of Wm. L. Finley, Oregon Fish and Game Commission, a beautifully illustrated bulletin on "Pheasant Farming," written by 'Gene M. Simpson, Superintendent of the State Game Farm at Corvallis, Oregon. In the introduction Mr. Finley states that the bulletin, which is a revision of a former one, is designed to furnish reliable information as to how pheasants may be successfully propagated. He also pays a tribute to Mr. Simpson, who has been particularly successful in rearing pheasants on the state game farm.

The first chapter discusses the propagation of game birds and defends the rearing and sale of such birds. Chapter 2 describes the different varieties of pheasants. The chapter devoted to "The Chinese Pheasant in Oregon" furnishes information as to the history of the introduction of this bird into Oregon and the success which has been obtained in establishing it. The succeeding chapters discuss the equipment for a pheasant farm, the ideal mother for pheasants, the food of young pheasants, enemies of the game breeder, and advice to the beginner.

This bulletin sums up the very information which the man who is starting a pheasantry desires. As it is the result of long experience, it can be successfully used as a handbook by the pheasant breeder. It is to be hoped that there will soon be enough demand in California for such a publication. As yet the breeding of pheasants in captivity in this state is in its infancy.

A GUIDE BOOK FOR SCIENTIFIC TRAVELERS ON THE PACIFIC COAST.

The Pacific Coast Committee of the American Association for the Advancement of Science is preparing a guide book for the use of visiting members to the San Francisco meeting, August 2 to 7, 1915. The book will be about the size of a Baedeker and will be published by Paul Elder & Company. The exact title will be "A Scientific Traveler's Guide Book to the Pacific Coast," and it will bear the subtitle "Nature and Science on

the Pacific Coast." This book will contain chapters upon the distinctive features of the region, including geology, palæontology, geography, distribution of land animals, fisheries, marine biology, flora and forests, marine botany, ethnology and archæology, agriculture, influence of early Spanish settlers, landmarks of history and literature, and the evident effects of an out-of-door life upon the development of the fine arts. These chapters will be critical descriptions written by men who are authorities in the several fields. General maps of the region and maps of the vicinities of the larger cities, directions for reaching the principal points of scenic and scientific interest on the Pacific coast, and directories of educational and research institutions will also be included. This book can be procured from the general office of the American Association or from leading book stores on the Pacific coast. The price will be $1.50.

THE PROTECTION OF NON-GAME BIRDS.

It seems to be impossible for a single session of the state legislature to go by without a bill being introduced to remove from protection such birds as the meadowlark, blackbird, and robin. In back of every such move is to be found a desire on the part of the city sport (we can not say sportsman) to have something more to kill. When such a bill was introduced in the last legislature by a San Francisco assemblyman the following comment appeared in the *Fresno Republican:*

The question of the usefulness or injury of these birds is a scientific one upon which we would rather have the judgment of the zoological department of the university than that of any aspiring restaurant keeper in San Francisco. And so far as the restaurant end of this world shaking problem is concerned, there is a much better and easier way of meeting it. We do not need blackbirds, meadowlarks, and robins for our bird pies. There are billions of English sparrows in the state which are doing no good to anybody. The United States government has devised methods for the easy capture of the sparrows, by trapping, in large numbers. Let the restaurants introduce sparrow pie as a diet if they will. There are plenty of sparrows and the pie is said to be good.

AN OUTBREAK OF QUAIL DISEASE.

The United States Department of Agriculture reports that the third known outbreak of quail disease has been discovered by the Bureau of Animal Industry. Quail disease is a highly infectious malady to which all native quail are apparently subject. The first outbreak occurred in 1907 and a second one occurred in 1912. The one in 1912 was checked through the suspension of importations of birds from Mexico. Birds imported from Mexico at Brownsville, Texas, on January 5, 1915, were found infected with the disease. All game commissioners and sportsmen who may have purchased birds for restocking this season are requested to advise the Bureau of Animal Industry if any of the birds are known to have died from disease of any kind. A quarantine has been established at Brownsville and every attempt will be made to prevent the spread of this exceedingly dangerous disease.

IS THE HOUSE CAT A DESTROYER OF BIRDS?

Mr. E. H. Forbush, State Ornithologist of Pennsylvania, is collecting data on house cats. He has sent out circulars asking for information as to the depredations committed and the comparative value of this animal as a destroyer of rodent pests. He plans to issue a bulletin on the subject, giving the results of his investigation. Of recent years the house cat has often been branded as an enemy of bird life. It is certainly true that stray cats which have no home and who live in almost a wild state do destroy many birds. Whether all cats will have to be placed in this same category remains to be seen.

PRICES DROP ON RAW FURS.

A St. Louis fur importer is authority for the statement that the losses on American raw furs caught last season alone, will amount to ten million dollars. This is due to the fact that most fur manufacturers are located in Germany and France. All price lists sent out since the first of the year show that only about half of the price paid last year is now being paid for raw furs.

KEEP YOUR FILE OF "CALIFORNIA FISH AND GAME."

We wish to urge all of our readers to carefully guard their file of "California Fish and Game." We hope that, as years go by, this periodical will increase in size and importance. We believe that already the material to be found in the first numbers has been of sufficient interest so that readers will wish to keep the back numbers for reference. Already the first number of "California Fish and Game" is at a premium, there being but a very small number of copies left for filling sets. For several months past "Forest and Stream" has been advertising for a complete set, or for certain old volumes for filling sets. A number of important university libraries have been attempting to complete their files for several years, but the early numbers of the magazine are not now available. The papers now being published in "California Fish and Game" are not only of interest to the general reader, but they are of value to the scientist and, as years go on, the early numbers will become more and more valuable. It is impossible for the Commission to issue very large editions, hence the necessity of conserving back numbers. If the added incentive of financial return is needed, we need but point to the prices paid for early numbers of similar periodicals.

FIG. 31.—New hatchery (E) at Sisson, completed January 1, 1915.

HATCHERY AND FISHERY NOTES.

HATCHERY ACTIVITY IN 1915.

On January 1st the new hatchery building at Sisson Station was completed (see fig. 31). The building is 195 feet long by 42 feet wide and has a capacity of 148 hatching troughs (see fig. 32). It will be used for hatching and rearing both salmon and trout. At the present time the building is nearly full of salmon eggs and embryo fish.

We have received at Sisson Station, from the U. S. Bureau of Fisheries stations at Battle Creek, Mill Creek and Klamath River, approximately 20,000,000 salmon eggs, to date. About half of the eggs received have hatched out and the embryo fish are doing nicely. Prior to the arrival of the first of the eggs, all of the buildings were put in excellent shape for the reception of the salmon eggs, and

with the completion of the new hatchery building everything was in readiness for the season's work. All four of the salmon hatchery buildings at this station will be crowded to capacity this season. As soon as the embryo fish reach the swimming stage, we will commence feeding them, and will hold and feed the fry in the hatcheries and nurseries until they have attained such size as will insure their being well able to protect themselves from their natural enemies, when they will be released in waters suitable for them.

The spawning of the Eastern brook and Loch Leven trout at Sisson Hatchery has been completed. About 1,757,000 Loch Leven and 1,198,000 Eastern brook trout eggs were taken from the fish in the ponds at this station. The eggs are hatching and the embryo fish are in excellent condition. During the coming month we will commence spawning the rainbow trout in the Sisson Hatchery ponds, and the indications are that we will secure a nice take of eggs from these fish.

The preliminary work for opening up the rainbow egg collecting stations, auxiliary to Sisson Hatchery, has been commenced. As the two stations, Camp Creek and Bogus Creek, on the Klamath River, were put in excellent shape for operations last season, very little repair work will be necessary this season. Both plants have been inspected during the past two weeks and were found to be in excellent condition for the season's operations. During the coming month we will send a crew of men to these stations to put in the traps and prepare for the run of spawning fish.

During the past year I have thoroughly investigated the Pit River country, with the idea of increasing our rainbow trout egg collecting operations. I found that rainbow trout ascend the tributaries of the Pit River in considerable numbers. From my investigations I found that Burney Creek seemed to have the largest run of fish, and I, therefore, selected a site suitable for carrying on the work. A lease was secured on the site selected, and I have just completed the final survey for the installation of the racks, trap, etc. Within the next two or three weeks I will have a crew of men on the ground, preparing the station for the season's operations. I believe that the Burney Creek Station will prove to be one of the best egg-collecting stations in the state.

During the spring of 1914 the old Snow Mountain Station, located at Snow Mountain power dam, Mendocino County, was operated by this commission, in an endeavor to ascertain whether it would pay to operate the plant on a large scale. The results obtained from the experiment were very gratifying and we collected a very good take of steelhead trout eggs. Accordingly, I made arrangements during the summer to have the station enlarged and put in first-class condition. The fish ladder over the dam was in poor condition and the traps were old and nearly useless. During the past fall, I had a crew of men engaged in putting everything in readiness for this season's work. The ladder was repaired, traps installed, rearing troughs and building enlarged and repaired, and a new water supply system installed. The work was completed during the fore part of this month and everything is now in first-class condition. We should collect a large take of steelhead trout eggs at this station this season. Part of the eggs collected will be shipped to the Ukiah Hatchery to furnish fry for stocking portions of Mendocino and Sonoma counties, and the balance of the eggs will be hatched out at Sisson Station for stocking steelhead waters throughout the entire state.

During the month of March the Tahoe Hatcheries will be opened up. Traps will be installed in Blackwood Creek, as in past years, and the seining crew will commence operations at the mouth of Taylor Creek as soon as the black-spotted trout of Lake Tahoe commence to run up the streams to spawn. This work will be under the supervision of Mr. E. W. Hunt.

The Scott Creek egg-collecting station will be operated to its fullest capacity this season. It is the desire of the board to collect a large number of steelhead trout eggs this season, so that the work of stocking the coastwise streams with large, well developed fry, may be carried out on the same lines as in the past two years.

At the Price Creek Hatchery 3,000,000 salmon eggs are now hatching. The fry obtained from this hatch will be distributed in Mad River and the streams flowing into Humboldt Bay, as well as in the

lower reaches of Eel River. The upper reaches of Eel River will be stocked with salmon fry by the Fish Commission's distributing car this season. Owing to the large number of salmon that ascended the river during the early fall freshets, the natural propagation will be larger than usual. The storms raised Eel River before the fishermen had a chance to take many of the salmon from the pools in the lower river, consequently a larger number of mature salmon ascended the river to spawn than usual.

The Fish and Game Commission is planning a hatchery for the district south of the Tehachapi. It is the intention of the board to establish a hatching station in Southern California to propagate enough fish to stock the streams in the southern part of the state, if a suitable site can be found. It will be more economical to hatch and distribute the fry from a hatchery located in the south than to ship the fish from the northern stations.

W. H. SHERLEY.

Fig. 11—Interior of new hatchery (E) at Sisson. This building contains 148 hatching troughs.

IDENTIFYING FISH BY THEIR SCALES.

The Fish and Game Commission has been making practical applications of the knowledge gained in the last few years in the study of fish scales. Shipments of fish come to San Francisco and other markets from Portland and Eel River and the old question arose, Were they salmon or steelhead?

The usual characters by which salmon and steelhead are distinguished are the size of head, shape of tail and number of rays in the anal fin. In the shipments these identification marks had been removed. The fish were dressed and the heads, tails, and anal fins removed, very evidently for the purpose of preventing identification. As it was lawful to have salmon, but unlawful to have steelhead in possession, the question was a vital one. A microscopic examination of the scales showed conclusively that they were steelhead, and gives the evidence upon which the violator can be prosecuted.

The concentric rings of growth on the scales of trout and salmon show winter and summer growth, much as do the rings of growth on a tree. Also, the growth in fresh water can be distinguished from the growth in salt water. Steelhead, after hatching from the egg, spend from one to three years in the stream before going to sea, but the great majority of individuals remain two years in fresh water. The salmon, on the other hand, spend one year, or less, in fresh water and then pass out to sea. Scales from the fish in question showed two years' residence in fresh water, which is proof enough they

are steelhead. But the scales give an additional proof, in the presence of "spawning scars." A steelhead leaves the sea and enters fresh water to spawn, and, during this process, leaves off feeding to a great extent and becomes thin through the absorption of the fat of the body. Even the edges of the scales imbedded in the scale pockets of the skin are eaten away, so that when the fish begins feeding again the scales take on new growth and a scar is left representing the ragged, eaten-away edge of the old scale. This constitutes the "spawning scar." Five per cent, or more, of steelhead show in this manner that they have previously spawned. Not so in the case of the salmon. They never show the "spawning scar," for they all die after spawning and growth is not resumed before death. Some of the fish examined in this instance showed these spawning scars, thus giving the additional proof that they were steelhead.

The only salmon with which the steelhead is likely to ever be confused is the silver salmon, or coho salmon. The silver salmon invariably matures and spawns at three years. In the case of the steelhead, spawning individuals will be found ranging from three to six years of age—all of which is clearly shown by the scales.

N. B. SCOFIELD.

ANNUAL FISHERY PRODUCTS OF CALIFORNIA.

The fisheries of California take annually 86,900,000 pounds of fish, for which the fishermen receive $4,000,000.

Five thousand men are engaged in fishing for profit in this state.

Fishing gear, including boats, nets and lines used in the state, is valued at $1,250,000.

TUNA INDUSTRY.

The tuna industry has grown until now it is the largest of our commercial fisheries. During the past season, the canners of southern California put up 350,000 cases, which were worth, wholesale, about $1,000,000. The weight of the fish required for this number of cases was 25,000,000 pounds, or more than double the total weight of salmon taken in the state. Besides this, 1,000,000 pounds were salted, dried or fresh. The long-finned tuna, the only variety canned, is a fish of wide distribution and spawns in the tropical waters of Mexico. It comes north in countless numbers, following the schools of sardines upon which it feeds. It is not believed that the present large take of tuna will seriously reduce the supply. At least, no action is contemplated to restrict fishing, as no young or spawning fish are taken in the state waters.

A NEW FISH HATCHERY FOR SAN BERNARDINO COUNTY.

Due to the interest and energy of the San Bernardino Trout Association, San Bernardino County now has a trout hatchery with a capacity of four million fish. The hatchery is located on the south side of Bear Lake and cost about twelve hundred dollars. It was built under the supervision of Mr. E. W. Hunt, superintendent of the Tahoe Hatchery.

The expense of the hatchery is to be borne by the members of the county association, and no money will be solicited outside of the county. The Board of County Supervisors will have charge of the distribution of the fish hatched and will see to it that local streams are well stocked with the output.

The stated purposes of the San Bernardino County Trout Association are as follows:

To finance and build a hatchery in Big Bear Valley and to use the output for the replenishing of the trout supply of the streams in San Bernardino County.

To turn the operation of the hatchery plant over to the State Fish and Game Commission.

To turn the distribution of the fry material over to the San Bernardino County Supervisors.

To promote, protect and further the game and fish supply of the county in every way possible.

To in no way interfere with the work of the State Fish and Game Commission, but by direct means, by its influence and membership to increase its usefulness.

MARKET FISHERMEN DISSATISFIED WITH FISH LAWS.

In southern California the market fishermen are working earnestly to secure the repeal of several sections of the fish and game laws during the session of the legis-

ditore. There are two measures especially which they wish repealed. One is the law creating a fish reservation around Santa Catalina Island, and prohibiting the use of all nets within three miles of the shore of the island. And the other is the law prohibiting the use of paranzella, or trawl nets, in the sixth district. The fishermen claim that these provisions practically ruin the market fishing along the coast of southern California.

CONSERVATION IN OTHER STATES.

A NEW DEVICE TO PROTECT BIRDS.

The general interest in bird protection has been productive of the invention of a device by Herr J. P. Thijsse of Utrecht to reduce the destruction of birds by lighthouses. The device has already been placed on two British lighthouses and is said to be giving excellent results. Lighthouses have long been instrumental in destroying great numbers of migrating birds, which have been attracted by the lights during stormy weather. In some places thousands of birds kill themselves by flying against the light on each stormy night during the migration season. The new device now being used in Great Britain is reported to be a series of perches on which the storm-driven birds can alight and rest until morning.

MORE WILD LIFE REFUGES.

The Minnesota Game and Fish Commission is planning to establish a chain of wild life refuges in that state. The plan is not however, that instituted by Indiana and adopted by Iowa, of permitting landholders to post their farms as state game preserves, allowing them to shoot "rabbits" on these "preserves" and supplying them with expensive exotic game birds for "shooting" purposes.—*Recreation*, December, 1914.

HOW TO ATTRACT BIRDS IN NORTHEASTERN UNITED STATES.

Farmers' Bulletin, No. 621, of the United State Department of Agriculture describes means of increasing the number of birds about homes in the northeastern United States. Methods of furnishing birds with nesting places, food, and water are described and figured, and methods of protection are also suggested. Emphasis is placed on the furnishing of food by means of plants and shrubs grown for that purpose. A table of seventy-five different native and introduced plants and shrubs are suggested as available for this purpose and the comparative length of the fruiting seasons of each is figured.

It is the plan of the United States Biological Survey to publish similar bulletins, which will furnish accurate information along these same lines for other parts of the United States. While on the Pacific coast recently, Mr. McAtee everywhere gathered information so as to make possible such a bulletin dealing with the northwestern United States.

California is so well supplied with natural food for birds that there is not the same necessity for furnishing them artificial food plants. Nevertheless, we shall watch with interest these practical attempts to increase the number of birds in limited localities.

BOY SCOUTS BECOME GAME WARDENS.

Under the leadership of M. D. Moser, twenty-one boy scouts of Tacoma, Washington, have been given a course of training in game protection. As a reward for their work the Game Commission of Washington has awarded them special badges. These boys are now doing good individual work, especially among the boys of the city, in protecting song birds. Recently these boys took a census of game birds in the vicinity of Tacoma. A great many game birds were found inside the city limits. Quail were most numerous, but great numbers of pheasants and grouse were also found.

AN EUROPEAN EXPERIMENT IN PROTECTING BIRDS.

The famous ornithologist, Baron von Berlepsch, has for a number of years been carrying on some interesting experiments in furnishing birds nesting sites and food on his estate at Seebach, in Thuringia. So successful has the Baron been in these experiments that his estate is now used as a bird protection experiment station by the government.

Nesting sites are furnished by two methods. Carefully prepared nest boxes are inserted in stone walls and hung up in trees. In addition, suitable shrubbery has been planted in many places on the estate, and this is carefully pruned to form desirable nesting sites. Recently a hedge has been placed in the midst of an extensive grainfield some distance from any wooded area, in order to test the willingness of birds to use such an isolated spot.

Practically all of the nest boxes become occupied within a few years and the nesting sites provided by pruning trees and shrubs are almost all utilized. The "show spot" on the estate is said to be a thorn hedge along the edge of a small wood, where each bush has been pruned for nesting purposes. A recent visitor counted thirty-one nests in examining 300 feet of this hedge. Baron von Berlepsch's experiments have been proving to the world for several years that the bird population on any given area can be increased by furnishing birds additional food and cover.

APPLIED ORNITHOLOGY.

Mr. Herbert K. Job, until recently State Ornithologist of Connecticut, has been placed in charge of a "Department of Applied Ornithology," established by the National Association of Audubon Societies. The function of this new department will be the furnishing of advice and assistance to the public relative to methods of increasing wild birds and propagating wild fowl and game birds in captivity. The department has a fund of five thousand dollars a year subscribed by interested persons with which to carry on its work.

LIFE HISTORY NOTES.

WHISTLING SWANS IN THE SACRAMENTO VALLEY.

A large number of whistling swans (*Olor columbianus*) were seen along Cache Slough and on Grizzly Bay last winter. On December 13, 1914, on Cache Slough, a flock of fifty were seen in flight, twelve of which were immature, distinguishable by their grayish, instead of snow-white plumage. On December 14, on Grizzly Bay, flocks of forty-nine, nine, and another one containing between twenty and thirty individuals were seen. The birds appeared to be unusually tame. The general report from residents in this vicinity is to the effect that swans have been more numerous this year than for several years past. H. E. Foster.

CANADA GEESE NUMEROUS IN SACRAMENTO VALLEY.

In the vicinity of Rio Vista, Solano County, there has been a noticeable increase this season (1914–15) in the number of Canada geese (*Branta canadensis*). We have not had so many honkers for many years.

All geese arrived very late this season. Gray geese were the first to arrive, a few flocks being noticed about October 10. No white geese arrived until late in November. In fact, it was about the 10th of December before we had the usual flight of geese. All geese are much harder to decoy than in former years. They all seem to fly in one large flock and do not split up into small flocks.

S. C. Cutcheon.

RING-NECKED PHEASANT BREEDS NEAR SAN BERNARDINO.

On April 22, 1914, I discovered a nest of the ring-necked pheasant (*Phasianus torquatus*) near San Bernardino, San Bernardino County. The record was published in the January-February "Condor," page 59. The bird in question (a female was all that I was ever able to see there) was reported by a farmer friend of mine to have a nest in a swampy weed patch on his farm. I at once investigated and was able to approach within a few feet of the bird as she was sitting on the nest. She was covering twelve eggs. I visited the place frequently within the next week or so, but was never able to locate her mate, but as there was a large swamp nearby well grown to tules and nettles it may be that the male was hiding there. Unfortunately a flood so dampened the nest that the eggs never hatched, although the bird kept to the nest almost

constantly for a period of about two months after the nest was discovered and the eggs were well along toward hatching when first found.

At first I thought that the above was the first time pheasants had been known to nest here, but later I discovered that others had hatched broods on several occasions in the past and on one or two occasions, at least, had reared broods. These birds are undoubtedly some that have escaped or been liberated by private individuals. Several have been liberated here in past years for the purpose of allowing them to breed and increase, but in my opinion these attempts have met with failure, mainly for the reason that the birds were liberated in the foothills and drier portions of the valley, whereas all that have been known to breed here have done so in the wet places around swamps or along the willow-covered banks of the streams flowing through the valley. I am convinced that if any organized endeavor was made to stock this section with the birds it would be successful, providing the right kind of ground was used—that is, the more moist and covered sections.

So far as I am able to ascertain, the only birds that have been successful in breeding here are those that have escaped from pheasantries. That even under these conditions, however, the birds are getting a slight foothold here is apparent from the increased number of reports of finding them heard among the sportsmen and farmers.

EDWARD WALL.

WHY DUCKS ARE DECREASING.

A comparison as to the number of different species of ducks this year and last would be of no value, unless the conditions which may have caused either the increase or decrease were given consideration.

Should I report to you that ducks were scarce this season without telling you of these conditions it would not establish the fact that ducks were becoming exterminated. A variety of conditions make for many changes in habits of waterfowl, especially migratory ducks and geese. I mean to say, climatic, feed, an abundance of water, early or late rainfalls or storms.

To illustrate my meaning: Should there be no early rainfall in California, and an early cold snap with freezing in the north in October, November, or December, ducks would pass by California and we would see but very few of them, but, should the season be open in the north and with early rains here which would make feed plentiful, these ducks would appear more numerous than ever. Again, should there be a heavy rainfall, as in the case of the present season, enough to insure the growth of the duck feed for next season, then it would insure a large crop of California hatched ducks and an increased number of migratory ducks when the freeze closes the extreme northern feeding grounds.

We must be guided in estimating the number of ducks seen by the conditions existing. If I can know the weather conditions in Oregon, Washington, and British Columbia, knowing the existing conditions here in California, I can surely predict to a certainty the extent of the next crop of ducks, when they will arrive, and the particular species that will take advantage of those conditions.

Another instance: There were 20,000 acres of rice in the Butte Creek country this year and scarcely any water anywhere except that used to irrigate the rice and the waste water running off. Now, the scarcity of water in that portion of the valley forced all the early local ducks into that body of water and they were, apparently, more plentiful in that particular locality than in many years. But had there been early heavy rains these ducks would have scattered over a larger scope of country and then some persons would have said that ducks were becoming scarce.

The choice varieties—mallard, sprig, canvasback—from the Sacramento Valley are nearly all shipped to San Francisco, where there is a good demand and they bring the highest prices; consequently we have most of the common varieties here on sale—widgeon, spoonbill, etc. Occasionally a few other varieties are sold by what we call "pot hunters" who carry their game to town and peddle it. The proportion of home ducks the past season (1914-15) were apparently more plentiful than the migratory ones, for the reason that the migratory ducks, canvasback, bluebill, redhead, etc., require more or deeper water than we have, for our

duck grounds are not permanent lakes but mostly shallow overflowed grounds. If we had had an early rainfall in California, canvasback, redhead, blackjack, and bluebill would have been much more in evidence. However, we did not get the rain until too late. Consequently the big flight went south down the coast and we did not see them.

As to what species have decreased in the last ten years, and what are the causes, can be answered only after analyzing all the conditions mentioned. Should the island districts in the Sacramento-San Joaquin delta, comprising all the overflowed and unreclaimed lands from Colusa to the mouth of the Sacramento River, return to the conditions existing before reclamation and remain so for a few years it would change the whole aspect of duck conditions in California, as it did during the floods of March, 1907, when all the islands in this district were flooded and apparently all the ducks in the world were in this area. In other words, it appears that ducks have decreased for the reason stated—lack of good feeding grounds. GEORGE NEALE.

STRANGE HYBRIDS.

As a rule, we think it is out of the ordinary to obtain a cross between birds or mammals divided by the systematist very much the general appearance of into separate families or genera. Yet, on the State Game Farm at Hayward a remarkable instance of the crossing of widely different birds has taken place. There are now to be seen at the game farm five birds which are the result of a cross between a ring-necked pheasant cock and a white cochin bantam hen. Mr Dirks reports that out of 229 eggs only 11 proved to be fertile and only 10 of the eggs hatched. The hybrids appear to be of two distinct kinds. Three of the birds are dark in color, whereas two of them are very light in color. The birds have

FIG. 33.—Hybrid birds at the State Game Farm at Hayward, California. They are a cross between a ring-necked pheasant cock and a bantam cochin hen.

pheasants, but cochin characteristics are shown in the feathering on the tarsi. (See fig. 33.) H. C. BRYANT.

SEA OTTERS NEAR POINT SUR.

A letter from John W. Astrom, keeper of the Point Sur Light Station, dated February 2, 1915, gives the following information regarding the number of southern sea otters (*Latax lutris nereis*) found in that locality: "During my service at this station for the past six years I have seen a good many sea otters. Especially during February and March of each year there seems to be more than at any other time of the year. At the present time, if walking on the beach between Light Station and Big Sur River one can nearly

always six two or three sea otters playing on the kelp some distance off shore. A year ago in February, after a heavy blow, I counted fourteen sea otters on one patch of kelp. It appears to me that sea otters are increasing at least around Point Sur the last two years."

Mr. A. Novelli of New Monterey writes as follows: "While on a trip down the coast about three months ago I saw thirty-two sea otters on the way down and twenty-six on the way back. I think there are more sea otters on this coast now than for a number of years."

Here we have more evidence as to the value of total protection as a means of bringing back a species which has been greatly reduced in numbers. Reduced nearly to extermination about three years ago, the sea otter is now beginning to show a slight increase. The conservation of no other mammal in the state could bring as large an increased income to our treasury, for the sea otter is the most valuable fur-bearing mammal in the world. Prime skins sold two years ago for over fifteen hundred dollars apiece. Since 1913 the killing of sea otter has been a high misdemeanor, punishable by a fine not exceeding $1000. The enforcement of this law appears to be greatly benefiting the species. H. C. BRYANT.

AN ANIMAL WHICH LIVES WITHOUT WATER.

Two kangaroo rats (*Perodipus ingens* and *Dipodomys merriami* subsp.) captured over a year ago by Mr. H. C. Ohl near Mendota, California, have been kept in captivity in order to study their habits. The most extraordinary feature of these animals is that they are able to live for a long period of time with no water whatsoever. For over six months they have been kept at the Museum of Vertebrate Zoology, University of California, and have been fed entirely on rolled barley. Not a drop of water has been given them and they have not even been fed on green food. According to Mr. Ohl the smaller animal (*Dipodomys*) has refused water since its capture in October, 1913. Last summer the larger one occasionally drank water when it was placed in a hole in a block of wood. It dipped its front feet into the water and then drank what water adhered to them. Both animals seem to be in the best of health despite this treatment, which would have soon proved fatal to other animals. With the above facts at hand, it is not difficult to understand why kangaroo rats are so abundant on the desert in localities miles away from water.

The kangaroo rat is a small nocturnal animal found most abundantly in desert localities. During the daytime it hides in holes in the ground. At night it hops about searching for weed seeds, which it holds in its front feet while eating, much as a squirrel holds its food. The very large eyes and long hind legs which enable it to jump great distances, make identification of this unique animal very easy. H. C. BRYANT.

WILD LIFE IN RELATION TO AGRICULTURE.

ECONOMIC STATUS OF THE SEA GULL.

Sea gulls have increased enormously on the coasts of Great Britain. As a result there has been considerable discussion as to the real value of sea gulls. The Suffolk and Essex Fishery Board has been carrying on some interesting investigations regarding the feeding habits of gulls. Stomach examination has been depended upon for accurate information as to the food taken. Data regarding the circumstances surrounding the taking of the specimen has been recorded in each instance. The food of four different species of gulls and of two terns has been investigated.

Among the most interesting things which came out in the investigation were the results of experiments to show the rate of digestion of fish. It was found that the larger gulls were able to digest fish at the rate of four ounces per hour and smaller gulls at a somewhat slower rate. "Provided the bird's stomach is empty, when the fish is taken, a black headed gull is able to digest a five-inch sprat within three hours, so that not a trace of any bones can be detected. As a result of experiments with sprats filled with methylene blue, it is certain that a gull shot in the afternoon, may show no traces of three or four fish taken in the morning."

Considering the destruction of all fish and of the food for fish, such as crustacea, crabs, etc., and the destruction of earthworms, carnivorous beetles, and cereals, by gulls as injurious and that the feeding habits of gulls are beneficial in so far as they destroy echinoderms in the sea and on the land, wireworms, injurious beetles and insects, and on occasions remove garbage, the investigation shows but fifty-three points in favor of gulls and 454 points against them. All of the gulls examined were taken on the sea coast. If some of them had been taken on the land a different result would have been obtained. The board in charge of the work has decided to continue the investigation and to devote particular attention to the land feeding gulls in the district, in order to investigate whether the harm done to fish and fish foods was counterbalanced by the benefits derived by the agriculturists.

DUCKS EAT OYSTERS IN WASHINGTON.

The United States Biological Survey has just completed an investigation into the depredations of ducks in the oyster beds of Washington and Oregon. Mr. W. L. McAtee, of the economic division of the survey, was in charge of this work. He reports that greater scaup ducks (bluebills) and white-winged scoters were actually causing damage by eating oysters on Oyster Bay, Washington. In other places damage was reported as negligible. The amount of damage, however, so the investigation showed, is to be reckoned as a few thousand dollars annually, rather than hundreds of thousands of dollars as reported by the oyster men.

Stomach examination showed that scaups took oysters an inch and a quarter in diameter and scoters some slightly over two inches. The only immediate remedy being used is to hire a man to shoot the ducks and frighten them away from the oyster beds.

This investigation, like many another one, has shown that the men concerned always exaggerate depredations by birds. Depredations such as these are more likely to decrease rather than increase, for the duck population is waning rapidly. Geese have now become so scarce in the Sacramento and San Joaquin valleys that practically no complaint is heard of their depredations in grain fields, whereas formerly, when more numerous, men were hired to frighten them from the fields.

WHY PROTECT THE SEA GULL?

Fishermen continually censure the sea gull for destroying many fish and food which would otherwise be eaten by fish. The commuter, also, as he watches the never ceasing line of gulls follow the ferries back and forth, wonders of what use these soaring hoards can be. Their value as scavengers is certainly evident to everyone, but these birds of the sea have also a value to the agriculturist. We recently received a report from a well known ornithologist, to the effect that near Elmhurst, Alameda County, hundreds of gulls were seen feeding in a recently ploughed field and following the farmer as he ploughed. The particular species so benefiting the agriculturist is usually either the California gull or the ring-billed gull. The former was noticeably abundant on San Francisco Bay during the month of January, 1915, when the above observation was made.

ENGLISH INVESTIGATOR DEFENDS THE ENGLISH SPARROW.

That black-listed pest of the farmer and fruit grower, the English sparrow, is now being found to perform some service as an insect destroyer during the nesting season. The results of stomach examinations of nestling English sparrows show that the food consumption of a hundred nestling birds from fruit growing districts in England is nearly two thousand insects in a single day, and that the birds in suburban districts need about one third of that quantity. Excepting for a few spiders and earthworms the whole of the food was found to consist of injurious insects. It is probably safe to say, also, that during the whole of the nesting period the parent bird feeds upon food similar to that which is fed the nestling.

The following conclusions of Mr. Collinge (Journ. Bd. Agri., 21, 1-6) are of interest: "In spite of all that has been written with reference to the depredations of the house sparrow, we do not yet possess that completeness of knowledge that justifies us in condemning it as

as "avian rat," or bird that should be exterminated. That it is far too plentiful no one doubts, but seeing that practically all modern houses provide numerous and safe nesting places for it this is scarcely surprising.

"It is extremely difficult to arrive at any satisfactory and convincing conclusion as to the precise economic status of this species, but after carefully considering the results obtained from an examination of the stomach contents of 404 adult birds, and of 42 and 287 nestling birds, and also from an examination of the faeces, the writer is of the opinion that if this species were considerably reduced in numbers, the good that it would do would probably more than compensate for the harm, especially in fruit growing districts.

"Any investigation of the economic status of most species of wild birds is incomplete, and to a large extent misleading, that does not deal with the question of the nature of the food fed to the young bird or nestling, for during the nestling period the food of the parent birds consists largely of insects, slugs, spiders, and worms, and that of the young almost entirely so, and the amount of food consumed is greater than at any other season of the year."

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

December 1, 1914, to February 28, 1915.

Offense	Number of arrests	Fines [illegible]
Game.		
Hunting without license	57	$570 00
Deer, close season, killing or possession	29	675 00
Illegal deer hides	1	25 00
Female deer, killing or possession	2	100 00
Doves, close season, killing or possession	5	125 00
Ducks, close season, killing or possession	1	[illegible]
Ducks, excess bag limit, killing or possession	21	250 00
Using live animal blind to shoot ducks	3	30 00
Shooting ducks from power boat in motion	1	15 00
Night shooting	11	220 00
Quail, close season, killing or possession	3	105 00
Quail, excess bag limit	2	25 00
Quail, sale	1	[illegible]
Quail in possession, trapped without permit	1	10 00
Rail, close season, killing or possession	1	25 00
Grouse, close season, killing or possession	1	25 00
Swan, killing or possession	3	75 00
Wild pheasants, killing or possession	1	[illegible]
Non-game birds, killing or possession	15	226 80
Total game violations	165	$2,129 80
Fish.		
Angling without license	1	$10 00
Fishing for profit without license	5	40 00
Dealing in fish and game wholesale without license	5	50 00
Underweight striped bass, possession	4	70 00
Dried shrimp and shells in possession	1	20 00
Undersized crabs, possession	9	95 00
Undersized Pismo clams, possession	3	85 00
Illegal nets	7	75 00
Steelhead trout, taking or possession, close season	7	300 00
Undersized catfish, sale	1	[illegible]
Sacramento perch, sale	1	[illegible]
Young of fish in possession	1	20 00
Taking shell fish in Monterey Fish Reservation	1	25 00
Abalones, taking or possession, close season	1	70 00
Crawfish, oversize, taking or possession	1	20 00
Total fish violations	51	$846 00
Grand total, fish and game violations	216	$3,726 80

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

December 1, 1914, to February 28, 1915.

Fish.

Striped bass	575	pounds
Salmon	176	pounds
Black bass	81	pounds
Steelhead trout	2,653½	pounds
Catfish	60	pounds
Sacramento perch	9	pounds
Smelt	110	pounds
Crabs	152	
Clams	350	
Abalones	39	
Lobsters (crawfish)	53	
Nets and lines	24	

Game.

Ducks	2,570	
Quail	122	
Geese	9	
Game birds	1	
Swans	1	
Non-game birds	85	
Rabbits	239	
Deer meat	33½	pounds

SEARCHES.

Illegal fish and game	56

FINANCIAL REPORT.

Statement of Expenditures for the Months of November, December, 1914, and January, 1915.

	November		December		January	
GENERAL ADMINISTRATION.						
Commissioners' traveling and other expenses	$40 65		$12 50		$83 80	
Salaries of administrative assistants	975 00		976 50		975 00	
Traveling expenses of administrative assistants	38 79		100 70		62 10	
Rentals, office and other supplies	261 20		268 61		270 47	
		$1,315 64		$1,358 31		$1,341 37
GENERAL FISH AND GAME PATROL.						
San Francisco Division.						
Salaries of deputies and employees	$2,860 50		$2,914 00		$2,946 00	
Traveling expenses of deputies and employees	1,141 64		935 58		963 46	
Rentals, office and other supplies	159 91		148 57		215 05	
		1,162 05		3,998 15		4,124 51
Sacramento Division.						
Salaries of deputies and employees	$2,613 00		$2,572 50		$2,415 00	
Traveling expenses of deputies and employees	1,131 78		1,124 99		1,154 72	
Rentals, office and other supplies	131 42		135 65		154 76	
		3,876 20		3,827 14		3,724 48
Los Angeles Division.						
Salaries of deputies and employees	$1,137 34		$985 00		$985 00	
Traveling expenses of deputies and employees	419 92		311 26		214 45	
Rentals, office and other supplies	149 70		148 86		126 33	
		1,706 96		1,445 12		1,325 78
Fresno Division.						
Salaries of deputies and employees	$1,270 00		$1,176 00		$1,288 00	
Traveling expenses of deputies and employees	657 72		737 65		907 63	
Rentals, office and other supplies	88 21		121 94		87 43	
		2,015 93		2,035 59		2,283 06
Miscellaneous Expenditures.						
Prosecutions and allowances		[illegible] 57		476 42		679 67
General printing		66 28		107 85		714 51
Total, general administration and patrol		$13,541 63		$13,254 06		$14,263 58

Probable cost general administration and game patrol (60%)		$8,124 98		$7,952 448		$8,322 908
Probable cost general administration and fish patrol (40%)		5,416 65		5,301 632		5,681 939
		$13,541 63		$13,254 08		$14,200 28
FISHERY EXPENDITURES.						
Administration.						
Salaries of superintendent of hatcheries and assistants	$340 00		$340 00		$340 00	
Traveling expenses, superintendent of hatcheries and assistants	115 25		130 65		149 90	
Office and laboratory supplies, etc.	29 57		72 20		33 25	
		$484 82		$542 85		$523 15
Fishery Research and Publicity.						
Salaries	$265 00		$265 00		$275 00	
Traveling expenses	148 00		59 30		73 26	
Supplies, etc.	4 94		7 20		2 15	
		417 94		331 50		350 41
Screen and Fishway Surveys.						
Salaries	$241 67		$265 00		$36 67	
Traveling expenses	93 10		70 35		20 00	
Supplies, etc.	4 48		2 18			
		339 25		337 53		56 67
Fish Transplanting (park-train, messengers, etc.).						
Salaries	$6 00		$65 00			
Traveling expenses						
Repairs and supplies	9 90					
		15 90		65 00		
Fish Distribution (car and messengers).						
Salaries	$207 84				$21 60	
Messenger allowance and traveling expenses	108 50				20 45	
Repairs	21 20		$8 26			
Supplies	84 01		53 26			
		421 55		61 52		41 45
Fish Patrol (launches, etc.)						
Salaries	$216 00		$210 00		$246 00	
Messenger allowance and traveling expenses	38 25		39 15		114 21	
Repairs	81 50				22 00	
Supplies (oil, etc.)	95 23		76 47		97 82	
		430 98		325 62		480 03

FINANCIAL REPORT—Continued.

Statement of Expenditures for the Months of November, December, 1914, and January, 1915—Continued

	November		December		January	
Sisson Hatchery						
Salaries	$1 821 57		$1,739 25		$1,504 64	
Traveling expenses	4 75					
Construction and repairs	193 41		185 02		13 20	
Fish food and ice for meat	339 41		78 27		155 08	
General supplies	34 66		79 61		141 48	
		$2,356 80		$2,082 78		$1,815 26
Tahoe and Tallac Hatcheries.						
Salaries	$19 00		$10 00		$10 00	
Traveling expenses						
Construction and repairs						
Supplies						
		19 00		10 00		10 00
Pixie Creek Hatchery.						
Salaries	$180 00		$125 00		$292 20	
Traveling expenses	1 00		3 75		21 85	
Construction and repairs			17 34			
Supplies	10 90		14 15		92 80	
		191 90		160 24		306 85
Ukiah Hatchery and Snow Mountain.						
Salaries	$178 25		$172 50		$64 00	
Traveling expenses	14 46					
Construction and repairs	48 07		204 80			
Supplies			* 36 75		2 75	
		240 78		431 11		66 75
Klamath Spawning Station.						
Salaries					$125 40	
Traveling expenses					41 70	
Construction and repairs						
Supplies					20 00	
						177 10

Miscellaneous Expenditures						
Printing and lithographing fishing licenses, notices, application blanks, etc		$55 85				4 80
Anglers' license commissions and refunds		591 10		1,183 50		776 00
Market fishing license commissions		9 25		9 75		12 50
Crawfish inspection		10 00		10 00		10 00
Total fishery expenditures		$6,540 00		$5,851 40		$4,629 60
GAME EXPENDITURES.						
Hayward Game Farm.						
Salaries	$203 30		$258 00		$200 00	
Traveling expenses	31 85		9 05		70	
Rent					112 50	
Construction and repairs	23 03				137 10	
Feed for birds	56 74		46 05		53 45	
General supplies	74 91		43 27		43 72	
		$389 03		$306 37		$567 47
Game Research and Publicity.						
Salaries	$167 85		$219 90		$624 22	
Traveling expenses	77 85		1 40		53 15	
Supplies, etc	24 88		39 88		595 40	
		270 58		261 18		1,272 77
Miscellaneous Expenditures.						
Printing and lithographing of hunting licenses, notices, application blanks, etc		1,350 50		1,513 20		1,652 50
Hunting license commissions and refunds		500 00		440 00		400 00
Mountain lion bounties						
Total game expenditures		$2,510 11		$2,520 75		$3,052 51
Grand total of all expenditures		$23,283 64		$21,626 23		$22,815 55
Total of fish expenditures		$11,657 55		$11,153 032		$10,340 982
Total of game expenditures		10,626 09		10,473 198		12,474 568
Grand total		$22,283 64		$21,626 21		$22,815 55

CONTENTS.

		Page
MANUEL L. CROSS, GAME WARDEN	*Ernest Schoeffle*	147
THE EQUITY OF THE GAME LAWS	*Chas. A. Vogelsang*	148
THE CALIFORNIA VALLEY QUAIL AND INTRODUCED GAME BIRDS	*George Neale*	153
THE SISSON FISH HATCHERY	*Harold C. Bryant*	156
TWO KINDS OF CONSERVATIONISTS	*W. P. Taylor*	161
RECENT FISH LEGISLATION	*N. B. Scofield*	164
RECENT GAME LEGISLATION	*Harold C. Bryant*	173
BOOKS AND PAMPHLETS RELATING TO CALIFORNIA BIRDS		175
EDITORIAL		178
HATCHERY AND FISHERY NOTES		187
CONSERVATION IN OTHER STATES		189
LIFE HISTORY NOTES		191
WILD LIFE IN RELATION TO AGRICULTURE		195
REPORTS—		
Violations of the Fish and Game Laws		197
Seizures		197
Lion Bounties		198
Financial Report		199

IN MEMORIAM

MANUEL L. CROSS

DEPUTY OF THE CALIFORNIA FISH AND GAME COMMISSION
FOR TWENTY YEARS

BORN IN PENNSYLVANIA, SEPTEMBER 4, 1842
DIED IN SACRAMENTO, CALIFORNIA, MAY 1, 1915
IN HIS SEVENTY-THIRD YEAR

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

MANUEL L. CROSS, GAME WARDEN.

Written in appreciation of his sterling character and splendid service by his Chief, who learned of him.

Manuel L. Cross, for twenty years a warden in the service of the California Fish and Game Commission, died in Sacramento on the first day of May of this year. This testimonial from a fellow worker is a humble effort to place the man and his service to the State before the readers of this publication. It is hoped that his life and work may be the source of inspiration for more earnest effort and more faithful service to the men and women who will continue in the work he regretfully laid down.

Up to the last three years, "Mannie," as he was called by his host of intimate friends, enjoyed splendid health and was able to set the pace for any of his younger associates. Latterly, however, he was a constant but patient sufferer from the malady of the heart which finally caused his death. But even during his illness he was a hard and faithful worker, always up at daylight and through the fish markets and along the wharves where the fish come in before the average city man is out of bed. No task was ever too hard for him nor was any day too long. If the job had to be done, Cross was there to see it through and see it through right.

The very soul of honor himself, he had no use for untruthful or dishonest people, with whom his work often threw him, and woe betide the person who broke a promise to him or failed to keep an engagement. Although possessed of the kindest heart in the world, he could so speak his mind to a dilatory associate as to create a very lasting impression. It was always his work to help in the "breaking in" process and many of us have cause to be grateful for the training we gained under the old man.

While not a scholarly man in the accepted use of the term, Cross had a fine mind, stored with useful information, which he was able to use. Probably no man in the State had a better "practical" knowledge of fish and the methods of fishermen and fish dealers than he. It is interesting, too, that not a man among the hundreds he had arrested during his two decades of service bore a grudge against him or entertained other than the most respectful and friendly attitude toward him. With Cross, an arrest was merely the carrying out of his obligation, in which he believed religiously, and this spirit was bound to impress itself upon the offender. As an Italian fisherman told me once: "I don't like to be arrested; but I violate the law and Mr. Cross he can do nothing different but bring me in. He don't like to do it, because I tell him I very poor man with big family, but he say, 'Angelo, it is my duty and I can do nothing else.' And so I not get mad at him, for I know him long time and he never do anything wrong to fishermen or tell them anything not true."

Cross will best be remembered by the anglers of the State for his work in distributing and "planting" fish. There are but few places in the State where black bass are now to be found that were not stocked by him. And when it is noted that this fish is now numerous and thriving in every bit of water suited to its peculiar needs, from northern Siskiyou to southern San Diego and from the coast to the Nevada line, the magnitude of the work of planting becomes apparent.

For many years Cross had charge of the Wawona hatchery and directed the distribution that has placed trout in hundreds of miles of streams and thousands of acres of lakes in the previously barren areas lying above and beyond the Yosemite Valley. As a hatchery man his work was always above criticism.

And now we will work along without him. The spirit of manly courage, unswerving loyalty, transparent honesty and unfailing courtesy remains with us, however, to the lasting benefit of the service to which we are devoted. I saw him at his sister's home three days before he passed away. When the knowledge had come to him that his time was up, he was fully prepared to go and only sorry that he couldn't see all the boys and tell them of the wonderful experience that had come to him in his last days. "Boy," he said, "I want you to tell all the crowd how it is with me. I used to be afraid to die because I was never sure about things; but now I know that everything is all right and I'm glad to go. You be sure and tell all the boys for me, 'Sheff,' and tell them I've been praying for every one of them."

And so I am giving the message as I promised my old friend as he left on his last "detail."—*E. S.*

THE EQUITY OF THE GAME LAWS.*

By Chas. A. Vogelsang.

Game laws, like other laws, are made for a definite purpose, and that purpose is a wise one. So much controversy and discussion have arisen over the present game laws of this State, and so many widely divergent views are expressed, that one who is neither a hunter nor a fisherman may be permitted to present what may be called a disinterested or non-partisan view of the question, especially as close contact with friends on both sides has given the writer an opportunity to hear each side of the story, and to study the effect of our present game and fish laws.

It is unnecessary to discuss or even dwell upon the legal status of such laws, when before us is the record of thirty-eight states of the Union prohibiting the sale of game. Supreme Courts have pronounced them constitutional, wise, and just laws; our highest legal tribunal, the United States Supreme Court, adding its opinion to the credit side of

*This article first appeared in *Western Field* for August, 1902, under the assumed name of "A. Convert." Mr. Vogelsang was then chief deputy of the California Fish and Game Commission. As it cannot now be charged that he is personally interested the article now appears under his own name. It is interesting to note that the California Fish Commission even as far back as 1902 took a decided stand against the sale of game by stating that this paper treats "fairly and forcibly a much abused and poorly understood subject," and by recommending over their own signatures the careful perusal of it.—*Editor.*

such laws, as if to make "assurance doubly sure"; so it leaves only the equity side of the question to be considered. In other words, are these laws fair? Are they based upon the great American principle of giving the greatest good to the greatest number? It is charged that they are tainted with that which is so abhorrent to every American mind, "class legislation"; that is, legislation against the masses and for the benefit of the wealthy, the "favored few."

This is the indictment that rolls so glibly from the lips of the favor-hunting politician, and that flows so freely from the pens of many of our newspaper writers. It is the stock-in-trade argument of many attorneys when "extenuating circumstances" are scarce and it becomes necessary to give the imagination free rein. Occasionally a Supreme Judge justifies his dissenting opinion by reasoning from such a viewpoint. Occasionally there is found one, like the late United States Supreme Justice Field, of sufficient mental vigor and moral courage to see and admit the error of his reasoning. His dissenting opinion written in the famous case of "*Geer* vs. *Connecticut*" is the Rock of Ages to which other dissenters pin their faith. These followers are unaware, perhaps, that Justice Field, in a conversation two years later with his friend E. S. Pillsbury, the well-known attorney of San Francisco, stated that he was "convinced that the doctrine laid down by him in the Geer case was not good law, and that he regretted that he had ever written that dissenting opinion."

No one who has given the subject a moment's serious consideration can fail to see the need of placing restrictions on the taking of wild game, both as to numbers and as to the length of the season in which they can be taken. The difference arises chiefly as to the degree of restriction, and there are inequalities no doubt. Our legislature is confronted with a serious problem when it undertakes the enactment of game laws. Our State is so large and so diversified, the conditions according to localities so varying as to breeding seasons, that a general law—the only remedy at its hands—can not fit each section to its satisfaction. When a constitutional amendment is added which will permit of dividing the State into game districts, then legislation for the different districts can be enacted. At present the legislature has as difficult a task as has the Federal Congress in passing a tariff bill that will suit to its satisfaction every state in the Union. Under present circumstances it does the best it can.

Many of those who criticise the restrictions do it thoughtlessly, not realizing that as civilization pushes out and extends its borders, taking up the wild lands, just so surely are the breeding grounds and habitat of the wild game reduced. The wild bird flies no faster, has no better means of defense, than it had two hundred years ago, but man has increased his efficiency to kill and take a thousandfold; advancing successively from the bow and arrow to a muzzle-loading gun, then to the rapid-firing breechloader with smokeless powder and belt full of cartridges, until finally there has been evolved the "Game Hog." Should there be any question about the wisdom of, and necessity for, these restrictions?

The charge is directly made that our legislators were guilty of framing laws in favor of the wealthy, the "favored few"; in other words, that they were either so base or so ignorant that they passed the

present game laws. The cry was taken up, and it is being industriously and persistently circulated by some of the editors in the larger cities and is copied by some of the interior papers who are "long on space," that an "infamous," a "villainous" law was passed, and this in the face of the fact that our Supreme Court declared the law constitutional and in no sense discriminating. Surely one has a right to wonder and inquire: Why this sharp distinction in terms? Are these laws so unfair? Do they discriminate against the masses? Are the poor deprived of their right, and obstacles placed in their way to prevent their ever tasting game? Is it the poor who clamor so loudly? Have their wails reached the ears and pierced the hearts of these great philanthropists, or is it possible the philanthropic judge and editor have heard that cry at home, and firmly believing that "charity begins at home," are preparing to receive it? Would it be a fairer, more equitable distribution to allow the few market hunters—most of whom are not taxpayers, and often not citizens—to take that which costs them nothing to develop, either in labor or thought; to shoot and ship to the cities where it can be and is purchased only by the well-to-do or wealthy classes? In truth, it is only these two extremes of society, constituting but a small proportion of our population, who are benefited by the sale of game.

It is true that the non-sale of game deprives those living in the cities who do not hunt but who would buy game if they had the legal right to procure it in that way. But it does not deprive them of the right that any poor man in the country is glad to exercise to acquire his. The city man has that same right reserved to him, and the fact is that all those who at any time purchase game when in the markets have the means and generally the time to acquire it in the same way as the man in the country. In other words, the people who can afford to live in clubs, fine hotels, or swell boarding houses, are deprived of their easiest way to get game—that is, to buy it. Are these people the masses? Are they the sick, the blind, the poor that our philanthropic editors have in mind? Is it in their interest that this pathetic wail is set up? Have the poor suddenly acquired such influence that they can be heard in these high places; that their cries are heeded when they talk of game laws, but go unheard when they ask for better wages to buy bread and clothes for their families? Selfish interests produce strange arguments.

This does not apply to all who write against the present game laws. There are some who honestly believe these laws work an injustice, because they do not understand the subject and follow blindly these clever but fallacious arguments, and because they believe that that which deprives the poor man and favors the rich is wrong. They do not realize that the non-sale of game deprives no man of work or position; that the game dealer employs just as many men whether it be poultry or game he handles; that the same is true of restaurants, hotels, or clubs; and that in the country the industrious, intelligent farmer who owns a few acres and follows the legitimate occupation of raising geese, ducks, turkeys, chickens, or squabs for the market, and who is generally a man of family, and always a taxpayer and a citizen, receives a better return for his products than when game is allowed to

be sold. Besides, when he or his sons so desire, they can take their guns (and they always have them), and go out and find some game which has not been shot or scared away by the market-hunter, who scours the country for that which costs him nothing in order to send it to the comparatively few of the wealthy in the cities who can afford to buy.

They do not realize that the present game laws are to the interest and advantage of such men, and to the disadvantage only of the market-hunter who shoots for the rich. They do not stop to contrast the two types of men—the market-hunter and the poultry-raiser—as citizens; they do not realize that every clerk, every laborer, every business man in the country can have his day afield with some profit and some pleasure; that every mechanic or man employed in business in the city can take a holiday and go into the country when game is abundant and be repaid for his time and expense. They do not stop to think that where one gun and necessary ammunition are sold to a market-hunter, twenty will be sold to men who enjoy hunting, and who will go hunting if there is promise of a fair return. In short, they do not understand that the bone and sinew of our country, represented by the great middle classes, will have an abundance of that which they do not buy, but which they can take in the way they enjoy the most.

It is true that the non-sale of game means that less game will be killed; that it can and will increase and multiply; and in that respect (incidentally) will the rich sportsman be benefited, and along with him will every poor man be a gainer. Indeed, it is doubtful if the wealthy sportsman will be so much of a gainer, since his well-stocked preserve is safe from the market-hunter, who must ply his vocation over that very land on which the poor man must of necessity depend for his pleasure and his share of game. As a matter of fact, many of the preserve sportsmen were against the present laws, because on their lands, over which none but themselves hunt, there was not noticeable the growing scarcity of game, and they objected to the wise provisions that placed a limit on the number they could shoot in a single day—a condition which placed them on the same footing with the man who does not belong to a club or own a preserve.

This brings us to the subject of preserves, and it is one that certain editors, who would like to pose as friends of the poor man, work to a finish. It is one of the subjects they revel in when recounting all the "evils" resulting from a number of wealthy men renting a piece of land, putting up buildings, hiring watchmen and caretakers, and in fact paying quite a sum monthly for the privilege of going several times a season for a shoot. Now this is not intended as a defense of preserves or baited ponds shot over from blinds—a practice that is barbarous! It is rather to invite attention to the fact that game laws have nothing to do with preserves. Will some of the learned judges and great newspaper protectors of the poor point out the connection?

Why tear down the game laws and give still greater advantages and opportunities to the preserve man? There is yet no legal way devised under our system of government that can prevent a man with sufficient means from purchasing or renting more land if he thinks he requires it, and after acquiring, controlling it, and saying how much or how

little it shall be open to the public. It would seem most unwise and even childish, because of real or fancied grievances against the preserves, that the only safeguards of the poor man be torn down, simply because some one must be sacrificed. Meanwhile, the preserve remains untouched.

To follow out this line of reasoning, we should deny to a person having land that is unproductive—and nearly all shooting preserves are—the right to rent it and receive an income from it. He should open it to all comers; he should be so liberal and broad-minded that he must not object if his premises are invaded, his stock wounded or driven away, and his fences destroyed; but he should sit calmly by—and wait for the tax collector. If he dared lease it to a man or number of responsible men who would take care of it and pay him besides, he would be committing an offense. Why not go a step further and advocate that, in a city supplied with street railways on which every one can ride for five cents, it shall be an offense against the public morals, peace of mind, etc., for any person to ride in any other way?

Another of the arguments frequently used is the pointing out of the hardships and suffering imposed upon invalids who "must" have game and are unable to purchase it. If that has any value, then there should be no close season whatever, no restrictive measures, else all the invalids would die during the eight months of close season; otherwise there are but four months in the year when they could exist, and now even that lease of life by our present "infamous," "villainous" game laws has been swept away. Unfortunately, statistics of the mortality are generally omitted. Is it not a fact that the sick of the masses or middle classes would appreciate a young squab, or the young of any other domestic fowl? Can they not be purchased at all seasons of the year, and as cheaply as game (when sold)? Does not that sale benefit the dealer, and also some other man following a legitimate occupation in the country?

Are we not growing more ardent year after year for active, health-giving outdoor life, for the strenuous life in the fields? What greater attraction does the country offer, whether one is camping or at a country tavern, than the promise of a well-filled basket or bag? What resort does not advertise—even when they have it not—its fishing and hunting? Does not that attraction, besides giving new vigor and health to thousands, mean the better circulation and distribution of the city's wealth? Is it not a positive benefit both to the city man and to the brother in the country? The present game laws are accomplishing the purpose for which they were enacted. One has but to travel in the country, anywhere, to see and appreciate the effects. Never in years have the quail and doves been so numerous. Deer are increasing, and there will be plenty for all. And it belongs to all—the people in the country as well as the people in the city. Under the existing laws the greatest good to the greatest number will be accomplished.

"With malice toward none and charity toward all" the foregoing is respectfully submitted, and with the hope that a little more serious consideration of all the aspects of the case will show that our present game laws are not only legal but also equitable.

THE CALIFORNIA VALLEY QUAIL AND INTRODUCED GAME BIRDS.

By GEORGE NEALE,
Assistant, California Fish and Game Commission.

Civilization and population forcing itself westward and into communities where game is or was once abundant, make new measures necessary in order to protect the existing game fauna of California. When these measures are not taken, history shows that certain species, those most easily killed or captured and those whose reproduction is less prolific, will be eventually exterminated.

The band-tailed pigeon is a good example of a species nearing extinction. This bird was once almost as numerous in California as the passenger pigeon was in the eastern and middle states. Only a remnant of the former numbers now remains. The records of the cloud-obscuring flights of the passenger pigeon seem like a fable, except to those who have seen and know. The few remaining mourning doves, once so numerous in California, furnish another example of the passing of species. The western mourning dove, sometimes called Carolina dove, is nearly as strictly migratory as waterfowl. Especially in northern California is the dove not a resident species. It nests throughout the State but its winter home is the southwestern portion of the United States as far as Mexico. The writer has seen the fall migration through New Mexico and along the line of the Mexican Central Railroad from the Rio Grande nearly to Mexico City. It is true that some doves remain in the southern valley portion of the State the whole year, as do a few migratory ducks and other birds.

Our laws have not given the dove proper protection. We have permitted them to be killed in the nesting season and on the nesting grounds, in what we term the open season. If this killing were permitted on the northern breeding grounds of the ducks and other waterfowl, what a protest would be made from California! From my own observation it is a conservative statement to say that the dove and band-tailed pigeon have decreased eighty per cent in northern and central California in the last twenty-five years.

The most flagrant cause of the near extermination of species is to be found in the unthinking or uncaring attitude of the people of the State. An added factor to be considered is the fact that certain species are not prolific in their reproduction, rarely having more than one or two eggs. Hence, in many seasons the whole, or at least part of the total increase of these birds may be destroyed by predatory animals or by human beings. This is true not only of the family Columbidæ to which the dove and pigeon belong but of the family Ardeidæ (egrets, herons, etc.) which are so much sought for by plume hunters, especially in the mating season. These birds are of a confiding nature, easily approached on the nest, and so make an easy prey to the gunner or netter. Consequently, our efforts should be centered in protecting those birds which are under natural disadvantages. But this is not enough: all of our game birds need to be intelligently conserved.

The protection now given many species of migratory birds by the United States Department of Agriculture will no doubt have a beneficial effect in perpetuating those birds not entirely exterminated.

The only game bird that has proved itself able to survive in the face of all the obstacles presented by encroaching civilization is the California valley quail (*Lophortyx californica*). This bird is able to care for himself under any and all existing conditions if given a square deal. It adapts itself readily to all conditions, and is the peer of any game bird in the world. This bird is also capable of taking the conceit out of any champion at the traps, and makes a dog well-trained on other game look like a tyro. It uses judgment in flight, when flushed, which a military expert would call masterly; and even when wounded it shows all the qualities of a strategist. Always willing to match its brains against those of the gunner, it, in most instances, meets with success. In egg production the valley quail excels all other game birds, not excepting the pheasant, partridge, grouse or sage hen, scarcely ever laying less than eighteen eggs at one year old, and at three years frequently laying twenty-two or more eggs. Furthermore, it usually succeeds in hatching and raising all or a very large percentage, and frequently hatches a second brood. This is nearly always the case if the first nest is destroyed. Quail eat almost any seed or wild berry. Noxious weed seeds are destroyed in great numbers; hence they are most useful birds to the farmer, orchardist or vineyardist. I believe the quail ranks highest as an insectivorous game bird.

The quail is one of the only game birds which is attracted by civilization, and if not molested this bird will make its home near a farm cottage. The valley quail is king of all he surveys, pugnacious to a high degree, and will hold his own against any other bird encroaching on his domain. He is always true to his mate, is invariably non-polygamous, and always chooses his own mate in captivity or freedom. This bird has survived a four months' open season with a bag limit of twenty per day, or 140 per week. It has been hunted with the best dogs in the world, chased with something like 121,664 automobiles fully armed, and rapid fire automatic and pump guns in the hands of 159,164 hunters. It is surely a marvel that any of these birds still remain.

The range of the valley quail in northern California is from sea level to 3,000 feet above, rarely ever being found above this elevation. The valley quail is not migratory, except under adverse food conditions. Only at times do they wander far from their feeding grounds, and they invariably return each season to the place where they were raised.

In over thirty years' experience in the field with this bird, from the south line of its range to its northern limits, I have never seen a sick or diseased valley quail. They are strong moulters, and this perhaps insures their being practically immune from disease. Of all the gallinaceous birds, *Lophortyx californica* is the fittest representative of the game bird family. Hence he will continue to prove the survival of the fittest. If the time ever arrives in California when all our game is on the verge of extermination, this grand game bird will be one of the last to disappear.

Our efforts to avert this rapid extermination of bird life by the introduction of new species of game birds into California has not met with success commensurate with the expenditure of money. One reason for this may be the pugnacity of native game species. Wherever other

varieties of game birds not native to California have been introduced on lands where California valley quail live, failure has always followed. This bird will always fight against the usurpation of his territory by other birds. It will attack a cock pheasant as readily as a small bird. Hence there are good reasons why it should be the one dominant game bird.

The following instance of pugnacity on the part of the valley quail has come to my notice. Mr. Hollenbeck of Ryer Island, California, who is a great lover of birds and animals, encouraged a large band of quail to remain on his land by prohibiting shooting. He fed the birds every few days, and they became so tame that they even came inside the house when called. In fact they were so tame as to almost be a nuisance. Knowing Mr. Hollenbeck's fondness for birds, I obtained for him some ring-necked pheasants. The quail, however, have driven away these pheasants, so that they are now to be found only in localities where quail are not found.

There may still be another reason why introduced game has not increased. Many people believe that all that is necessary in the introduction of a game bird into any locality is just a matter of securing the species to be introduced, giving the birds their liberty and awaiting favorable results. But the fact that a Master Hand has not only distributed game birds and animals, but has adjusted the flora and fauna of the universe to certain life zones most suited to their existence, is often overlooked. We must know the conditions and seek to introduce such birds as will thrive under them. No game bird has as yet been introduced into California which has proven to be adapted to the geographical and climatic conditions obtaining here.

One of the principal reasons for our failure in the introduction of game birds in the past has been that none but ground-roosting birds have been selected. As a result they have been attacked by predatory animals. These latter are possibly of a larger variety and more numerous in California than in any other state. The valley quail has at some time had to adapt itself to these conditions. This bird is now a tree or bush-roosting bird, and this makes it practically immune from the depredations of these numerous animals. On the other hand the Hungarian partridge, bobwhite, pheasant and other quails are ground-roosting birds. Therefore these birds are subject to depredations from the many animals which roam and feed at night and can not obtain the foothold which they should in California.

Let us keep in mind our experiences of the past and see that birds more suited to our conditions are introduced—or better still, that such hardy birds as the California valley quail are sufficiently protected to make stocking with foreign game birds unnecessary.

THE SISSON FISH HATCHERY.

By H. C. Bryant,
Game Expert, California Fish and Game Commission

For nearly forty years the State of California has been artificially rearing fish and planting them in the streams of the State. As a result our streams are well stocked with fish. Probably over ninety per cent of the fish in most of the streams of the State at the present time have been reared in State hatcheries. A person who simply reads the biennial reports of the Fish and Game Commission, where he sees statements as to the millions of fish planted in the streams of the State, can not realize the tedious and painstaking work needed to make such statements possible. Experienced workers are needed to bring the fish from the egg stage to the size when they can be safely planted in the streams. Then, too, whereas a small amount of care is needed for

Fig. 34. The Sisson Fish Hatchery, March, 1915.

rearing a small number of fish, added care needs to be exercised when millions are being reared. A trip to one of the hatcheries can alone bring convincing evidence of the work being accomplished.

The State of California owns and operates six hatcheries. The largest and best equipped of these is the one located at Sisson, Siskiyou County. Under the charge of Mr. W. H. Shebley, Superintendent of Hatcheries, the Sisson Hatchery has evolved from a small plant with an output of a few thousand fish to what is probably the largest hatchery in the world. Mr. Shebley received his first training under his father, Mr. J. V. Shebley, who originally owned a private hatchery in Nevada County. While still a boy, Mr. W. H. Shebley, the present superintendent, was hired by the then newly-established Fish Commission to plant fish in different parts of the State. In 1885 he succeeded his father in charge of the Shebley Hatchery. Four years later he became superintendent of the Hat Creek Hatchery on the Pit River and since then he has at different times been in charge of nearly every hatchery in the State. The first hatchery building at Sisson was erected in 1888. In 1893, Mr. Shebley was placed in charge, but even after

that time he managed the planting of fish throughout the State and in most cases superintended the work personally. In the early days he did practically all of the work himself, spawning thousands of fish and caring for the eggs and fry both day and night.

The present article would make more interesting reading could the author have visited Sisson Hatchery twenty years ago so as to have made a comparison with the hatchery as it exists today. The few following comparisons have been made possible by reference to old reports. The site chosen for Sisson Hatchery has left nothing to be desired. Situated near one of the tributaries of the upper Sacramento and near what is known as "Big Spring," an abundance of pure cold water has constantly been available. Not only has the location proved valuable in this respect, but it has the added charm of being beautifully situated, with Black Butte in the foreground and Mount Shasta, covered with

Fig. 35. Artificial spawning of a rainbow trout. The eggs are "stripped" from the fish into a small pan.

eternal snow, a little farther away. Originally one small hatching house, a plain wooden structure forty by sixty feet, equipped with forty-four troughs, and about half a dozen ponds, were constructed. At the present time there are five large hatching houses with several auxiliary "batteries," and fifty-two ponds on the grounds. The state owns seventeen acres. This is well fenced and has a comfortable home for the superintendent, several cottages for employees, barns and other needed buildings. In addition the grounds have been made very attractive by trees, flower gardens, and several small aquaria. Consequently, during the summer season as many as two hundred persons visit the hatchery daily.

A trip through the grounds gives one a surprisingly increased knowledge of the work which this State institution is accomplishing. For instance, let us start in the main hatchery building. After passing

the offices of the superintendent and his secretary, we are confronted with long lines of troughs through which streams of cold water are constantly flowing. In these troughs can be seen thousands and thousands of trout fry, most of them at this time of the year (March) two or three months old. We are told that there are about twenty-five thousand fish to each trough, and the black moving mass convinces us of the truth of this statement. The troughs are all painted white and the water is exceedingly clear, so that the dark-colored fry are very conspicuous.

As we leave this building, we walk between a number of large trout ponds containing fine large specimens of several different species. In one pond may be seen Loch Levens, the original stock of which was imported from Scotland. In another pond can be seen eastern brook

Fig. 36. Eggs of a rainbow trout being fertilized with milt from a male trout.

trout, smaller, but beautifully spotted fish. In still another pond rainbow trout, that fish par excellence of the California fisherman. Some of them are larger fish than most fishermen have ever seen. These fish are kept from year to year in the ponds and from them many of the eggs used for hatching are procured.

In order to prevent screens from clogging with leaves and other debris at the point where the water flows out of the ponds, a peculiar type of screen has been invented. This consists of a cylinder covered with wire netting, continually revolved, the power being supplied by a paddle-wheel attached close by.

There has been much discussion as to whether the "pond system" is a more effective means of procuring the eggs needed for hatching than the "trapping method" now almost exclusively used. This latter method consists of trapping the trout when they are running up stream to spawn, spawning them at the stations where they are caught, and

shipping the eggs to the hatchery. This method, although as a rule proving very successful, is always somewhat unreliable, for the number of fish trapped for spawning purposes is variable from year to year. Pond-reared trout can always be depended upon. Consequently, Mr. Shebley is endeavoring to expand the pond system in order that a supply of eggs may always be procurable no matter what the run of fish is in the streams. By purchasing a few additional acres, the State could increase the pond system sufficiently to maintain a sufficient breeding stock, and thus assure a good take of eggs each year.

We have now reached the spawning house. Here three men are at work spawning rainbow trout. One tank is filled with female fish and the other with males. One man takes out a fish, another man wearing cloth gloves takes hold of it firmly, and a third man "strips" it. (See figs. 35 and 36). When a small pan of eggs is procured "milt" is obtained from a male fish in the same manner and the eggs are set in a dark place for a few minutes until fertilized. Several thousand eggs are often obtained from a single fish. When fish are found "unripe" they are returned to tanks where they are kept for several days after which they are again tested. The operation of spawning appears to the observer as though it would seriously injure the fish. However, this is not the case, for fish have been successively spawned at Sisson for as many as five years.

After the eggs are fertilized they are placed in a wire basket hung in a trough of running water. After a week or more each tiny fish has become large enough so that it can be seen inside of the egg. At the age of three or four weeks, the fish hatch out. Unlike birds, however, they hatch tail first. Attached to the under surface of each tiny fish is a large bag or sac containing yolk. The young fish feed on the material in this yolk sac for two to three weeks. By that time it becomes entirely absorbed and the fish begins to take food for itself During the period when fish are unable to take food, they are rather sluggish and remain very quiet. Later, however, they become very active.

Many of the salmon and trout eggs used for hatching are procured at "spawning stations" at the headwaters of the larger rivers. Racks are placed on the smaller creeks up which the fish run to spawn. (See fig. 37), and large numbers of "ripe" fish are entrapped and spawned artificially. During the fall of 1914 the United States Bureau of Fisheries secured in this manner over 30,000,000 salmon eggs. These were turned over to the California Fish and Game Commission and a very large proportion of the eggs hatched out. Three of the hatchery buildings at Sisson were needed to take care of the eggs and fry.

A visit to the other hatchery buildings discloses millions of salmon eggs and tiny salmon which have just hatched. The eggs of the salmon, in contrast to the dark-colored eggs of the trout, are reddish in color. In order to obtain the approximate number, the eggs are measured into the baskets with a measuring glass the capacity of which is known. In some instances from 30,000 to 35,000 salmon eggs are placed in a single basket. After the eggs have hatched the number of fish in each trough is usually reduced to about 25,000.

A large force of men are employed in keeping the troughs clean. All sediment and debris from the water is swept out of the troughs and all dead eggs are removed by means of a pipette. Both eggs and young fish are parasitized by certain bacteria and care must be taken to see that all infected individuals are removed to prevent spread of the infection.

In order to feed the millions of fish at the Sisson Hatchery, it is necessary to maintain a kitchen where food is prepared. From six hundred to seven hundred pounds of this prepared food is fed to the fish every day during the rearing season. In order to make this amount of food it takes about three hundred pounds of meat. This is obtained from slaughter houses in San Francisco. The food is pre-

Fig. 37. A fish trap on the Klamath River at Copco, California. Thousands of fine large trout were obtained for spawning here.

pared by taking such scraps of meat as beef heads, livers, lights, and the like, grinding them up, mixing them with corn or other meal, and clabbered milk, and cooking this into a sort of mush. The pond fish soon learn to know the man who feeds them, and they will follow him about from one side of a pond to the other. When the food is thrown into the pond, there is a wild dash for it, and the water flies in every direction. In addition to this food the pond fish often obtain insects which alight on the water, and not infrequently a trout can be seen "jumping" for such delectable morsels. A similar kind of food is prepared for both the trout and salmon fry.

When the fry are old enough to care for themselves, they are placed in "nurseries," small ponds made especially for the small fish. As pond trout and salmon are somewhat cannibalistic, it is necessary that

the fish be of about the same general size in each pond. Fry are kept in these nurseries until ready to be shipped to different parts of the State. The State owns its own fish distribution car which carries the fry to the nearest railway terminus. From the railroad station the fish are carried into the higher mountains by means of auto trucks, wagons and pack animals.

All trout are very much subject to disease, and it is therefore necessary that they be continually watched to prevent an epidemic. Mr. Shebley has devised several methods of treating the sick fish. Some are given an antiseptic bath, others are cured by having the parasitic crustaceans removed from their mouths and gills. Nor is disease the only thing with which a superintendent of a hatchery has to contend. For instance, a number of years ago, Mr. Shebley found many fish dead in the ponds. Examination showed that the stomach of each fish contained a number of little pebbles. Evidently the food which they had taken forced the fish to attempt to procure grinding material and this had eventually caused their death. In another instance the stomachs of dead fish which were examined were found to contain small masses of cobweb. Investigation showed that the meal used in the food was badly infested with meal worms, and the webs made by these worms had formed little balls in the stomach, and so had caused death. Slight carelessness often results in heavy losses. It has only been by careful attention to details and by continued study of the diseases attacking fish that this large hatchery has been made so successful.

The California Fish and Game Commission can point with pride to its accomplishments along the line of artificial propagation of fish. Had no work in other directions been done, the Department of Hatcheries has accomplished results which will justify all the expenditure of the Commission in years past. The degree of perfection to which the stocking of our streams has been brought is truly remarkable. We wish that as great success could be obtained in our attempts to restock our game covers, but so far this newer work has largely failed. Conservationists are searching for the man who can put game propagation on the same plane with fish propagation.

TWO KINDS OF CONSERVATIONISTS.

By W. P. Taylor,

Curator of Mammals, California Museum of Vertebrate Zoology.

Only a little study of the conservation situation in America is sufficient to show we have allowed certain parties at interest to take more than their rightful share of the resources of wild nature which as a matter of simple justice belong, not only to all the people now living, but also to the generations of the future indefinitely. Only a little study suffices to emphasize certain obvious necessities which must be complied with if we are to bring to bear any effective remedy.

It is at this point that there is an unconscious separation of the people into two groups: the apathetic and the active.

It is worse than useless to know the facts and necessities of the game conservation situation if we are not willing to translate inclination and impulse into action.

There are two kinds of conservationists; the conservationist of the folded hands and the conservationist of the clenched fist.

There is much to be done, and it will not be done by the conservationist of the folded hands!

Will you permit one who has been close to the firing line to offer some suggestions to those who have the welfare of our resources in fish and game at heart? First and foremost, read and promote the circulation of Dr. William T. Hornaday's two books "Our Vanishing Wild Life" and "Wild Life Conservation in Theory and Practice." Join some society which is active in the fight to save the game, such as the Cooper Ornithological Club, Sierra Club, California Audubon Society, State Humane Association, the Wild Life Protective League of America or the California Fish, Game and Forest Protective League. Enlist the interest of the societies and clubs of which you are already a member in the study of nature and in the preservation of our natural resources. Organize a local Audubon Society or a Sportsman's Game Protective Association in your home town. If you desire information along any of these lines write to Dr. Harold C. Bryant, Game Expert, California Fish and Game Commission, University of California, Berkeley, California, and you will receive generous and sympathetic assistance.

Certain communities in the mountains of California apparently have no interest whatever in game protection. In other communities in similar situations the conservation tide runs strong. I can not escape the conviction that, in these latter cases, interested and enthusiastic individuals have leavened the whole lump, have transformed their communities from opponents to supporters of preservation of wild life.

Put your hand to the plow, and never look back till what you desire has been accomplished. Write articles for your local papers, tell the boys of sling-shot and air-gun age what kinds of birds it is lawful and what kinds it is unlawful to kill. Get in touch with your game warden, express an interest in his work and an appreciation of his services. Assure him of your hearty co-operation in his labors for the protection of wild nature.

Storm the citadels of indifference, show your friends that whatever preserves the natural attractiveness of our State is good business. Emphasize the dangers of the *laissez faire* policy.

If you are a teacher, commend the protection of wild life to your pupils, and lead them to a love for the out-doors.

If you are a professional man, contribute articles to your professional journals, and initiate and give vigorous support to movements for a better sentiment in your own community.

If you are an editor, upon you, in no small degree, will depend the education of your city along these lines.

If you are a member of a woman's club, secure the interest of your organization in the work of saving the game of California. Communicate with Mrs. Harriet Williams Myers, 311 Avenue 66, Los Angeles,

California, chairman for Wild Life Conservation, California Federation of Women's Clubs, and promise your co-operation.

If you are a sportsman, join with others and form an organization for game protection. Take "law enforcement" as your slogan. Do what you can to set up and maintain high standards among the men who hunt.

If you are a farmer, learn to know your friends among the wild mammals and birds, and see to it that the individuals or species you would condemn as hurtful to your interest are guaranteed a fair trial at least before execution. Provide food plants, shrubbery and nest-boxes for beneficial birds, and reserve a part of your acres as a sanctuary where game may be safe from molestation.

If you are a parent, inculcate in your children the highest possible ideals in the matter of preservation of all our natural resources, and train them up, by precept and example, to avoid individual and social wastefulness.

If you are a plain citizen, then yours is the heaviest responsibility and the highest privilege of all; for you must decide through ballot box and personal influence what shall be done with California's wild game.

I believe that all true sons of California, whether native or adopted, are idealists and love justice and square dealing. We have been accustomed since the days of the rugged Forty-niners to good-natured contests of one sort or another, and fair play is a tradition wrought into the fiber of our commonwealth. All considerations of justice, square dealing and fair play lead with inevitable certainty to the conclusion that we hold those natural resources which still remain to use in trust for the generations of the future; and that while we may legitimately take toll of these possessions, we must not impair the seedstock.

The Taj Mahal of Agra, India, is said to be the most beautiful building in the world. Its construction occupied ten thousand men for twenty-two years. Yet a few vandals could wreck it overnight, so much more rapidly do the forces of destruction work than those of construction.

The building of living species, the end results of the consummate art of Nature, has occupied the Creator for a time so long that we can no more than guess at it. Yet we of this generation can permit of the utter destruction of some of these species.

It is doubtful whether the Taj Mahal could ever be replaced were it to be destroyed, but it is *certain* that living species, once destroyed, can never be replaced. Man, the king of creation, even at this the summit of his glory, cannot undo extermination!

It is as sure as death that we will be held responsible for our acts by the generations of the future. We ought to be held responsible. Let us keep the faith!

RECENT FISH LEGISLATION.

By N. B. Scofield.

The Districting Bill.

(Senate Bill No. 681. Senator Flint.)

A bill has been passed by the legislature and signed by the Governor which makes some radical changes in the fish and game districts of the State. At the present time the State is divided into seven fish and game districts which were created so that different parts of the State could have fish and game seasons that would conform to the different conditions of each. Besides these seven districts many smaller reservations and refuges have in the past been created, such as Cache Slough, Napa River, Mokelumne River, Catalina Island, the two reservations in Monterey Bay and many others. Laws have from time to time been passed regulating the fishing in each of several streams, as in Smith River, Klamath River, Eel River and Sacramento River. A recent court decision has held that as the State has been divided into fish and game districts, as provided by the constitution, for the purpose of making appropriate laws for each respective district, a law to be constitutional must apply to the whole of one of the districts. Under this decision the laws regulating the fishing in a stream or part of a stream, or in any bay or part of the coast waters, or the hunting in any portion of the State other than the whole of one of the seven districts, would be unconstitutional. It therefore appeared necessary to redistrict the State and wherever special laws were required to make of that part a separate district.

The bill as finally passed, dividing the State into thirty fish and game districts, was drawn to take care of these separate and different conditions. There are four main districts, Nos. 1, 2, 3 and 4, which, with the exception of a few game refuges, takes in about all the land of the State and might be called game districts in distinction from fish districts. The districts Nos. 5 to 23 inclusive are fishing districts, which in the main cover the same territory and follow the same lines in conformity with the present laws covering the same. For example, Nos. 5, 6 and 7 are the commercial fishing areas for Smith, Klamath and Eel rivers, respectively. The districts Nos. 24 to 29 are game refuges, some of which are new.

The bill has met with some criticism on the ground that it is a complicated arrangement and a fisherman or hunter will never be sure what district he is in, but when one knows what the present laws are and the boundaries as defined at present he can easily see that the new "districting bill" simplifies rather than complicates. Many special fishing districts have been cut out and the seven main or game districts have been reduced to four. What makes it appear complicated at first sight is that many of the boundaries as they already exist in the present laws are brought together in one bill. It will be found that the laws will be simpler and more easily understood and that under the new system of districts many of the present laws have been eliminated.

The four main fish and game districts are exclusive of the remaining districts and can easily be understood by consulting the accompanying map (fig. 38). The districts 5 to 29, to describe them very briefly, are as follows:

Fig. 38. Map showing new fish and game districts. Many of the districts along the coast have reference only to laws on fish. Although seemingly making laws more complicated, the new districts will in reality improve fish and game administration.

No. 5. The ocean waters and the tide lands of Del Norte County north of Point St. George and including the lower part of Smith River.

No. 6. The ocean waters and the tide lands of Del Norte and Humboldt counties lying between Point St. George and Mussel Point and including the lower end of Klamath River.

No. 7. Consists of the ocean waters and tide lands of Humboldt County lying south of Mussel Point and includes the lower end of Mad and Eel Rivers.

No. 8. The waters of north Humboldt Bay.

No. 9. The waters of south Humboldt Bay.

No. 10. The ocean waters and tide lands of Mendocino, Sonoma, Marin, San Francisco, San Mateo and Santa Cruz counties as far south as Santa Cruz Point and includes Tomales Bay and excludes Bolinas Bay and all lagoons.

No. 11. The waters and tide lands of the Golden Gate and of Richardson Bay.

No. 12. The waters and tide lands of San Francisco Bay, except the portions included in districts 11 and 13; the waters and tide lands of San Pablo Bay, of Carquinez Straits and Suisun Bay; the waters in the main channel of the Sacramento River, Steamboat and Sutter sloughs as far up as Colusa; the waters of San Joaquin River, Old and Middle rivers to the south boundary of San Joaquin County.

No. 12a. The waters in the main channel of Sacramento River from Colusa to Vina.

No. 13. The waters and tide lands of south San Francisco Bay.

No. 14. The waters of the lower six miles of Scotts Creek, Santa Cruz County.

No. 15. The waters of San Lorenzo River and tributaries and Monterey Bay waters and tide lands lying north of a line from Point Santa Cruz to Soquel Point.

No. 16. The waters and tide lands of Monterey Bay lying south of a line extended east from Point Pinos.

No. 17. The State waters and tide lands of Monterey Bay not in 15 and 16 and the State ocean waters and the tide lands to Point Carmel ("Point Lobos") in Monterey County.

No. 18. The State ocean waters and the tide lands from Point Carmel to the north boundary of Santa Barbara County.

No. 19. The ocean waters of the State and the tide lands from the north boundary of Santa Barbara County to the south boundary of San Diego County and includes all the islands and surrounding State waters and the tide lands, except Catalina.

No. 20. Island of Catalina and surrounding State waters.

No. 21. Waters and tide lands of San Diego Bay.

No. 22. Waters of Salton Sea and Colorado River.

No. 23. Land and waters within Lake Tahoe and Truckee River drainage basin.

No. 24. Cleveland National Forest in Orange and Riverside counties.

No. 25. National Pinnacles Monument, a park in San Benito County.

No. 26. Trinity National Forest, a park in Trinity County.

No. 27. State Redwood Park, Santa Cruz County.

No. 28. A portion of the Angeles National Forest in San Bernardino County.

No. 29. A portion of the Angeles National Forest in Los Angeles County.

Bills Relating to Fish.

(Senate Bill No. 155. Senator Kehoe.)

The bill amends section 629 of the Penal Code and relates to the screening of irrigation and power ditches to prevent young trout and salmon and other fish from entering them and becoming lost. The

change in the section provides that the parties concerned be given a hearing, and details the method by which the hearing may be had and the evidence taken.

(Senate Bill No. 688. Senator Mott.)

This bill changes section 628*b* of the Penal Code making the close season for black bass in all districts except 3 and 4 from December 1 to April 30, inclusive; and in districts 3 and 4 from December 1 to March 1, inclusive. It makes the close season for Sacramento perch, crappie and sunfish in all districts from December 1 to April 30. It prohibits the sale of black bass, Sacramento perch, crappie and sunfish. In other respects the section remains the same as at present.

(Senate Bill No. 699. Senator Brown.)

The bill deals with trout and amends section 632 of the Penal Code. Section 632¼, which deals with steelhead trout, is repealed and the steelhead, rainbows and cut-throat trout are all classed under the word "trout" with the object of doing away with the question of: What is the difference between a rainbow and steelhead?

The trout limits are not changed. The close season for districts 1, 4, 5, 6, 7, 8, 9, 19, 21, 24, 26, 28 and 29 will be December 1 to April 30, inclusive. This is a change from the present season in that it will open fifteen days later in Del Norte and Humboldt counties and will open one month later and close one month later in southern California. This is a better season and meets with general approval. The close season for districts 2 and 3 and in the included and minor districts is from November 1 to April 30, inclusive. The present season in the counties covered by district 2 opens fifteen days earlier than this for trout other than steelhead and one month earlier for steelhead. The season for all trout opens one month later than at present in district 3. In district 23 (waters of Tahoe and Truckee basins) the season will open June 1, which is one month later than the present law. It will be unlawful to take trout within 500 feet of the mouth of any stream or in the lower two miles of any stream in this district between November 1 and July 31, inclusive. The same provision for the taking, shipping and selling of twenty black spotted, Tahoe trout irrespective of weight, remains in the law but applies to districts 23 and 1.

The bill provides for taking two trout a day with hook and line or spear in district 2 between December 15 and February 14. Under the present law steelhead to the extent of 30 pounds a day may be taken any place in tide water up to January 1, but with hook and line only.

The bill provides for marketing the steelhead caught while fishing for salmon in districts 5, 6, 7, 8 and 9.

(Senate Bill No. 705. Senator King.)

The bill amends section 634 of the Penal Code and relates to salmon. The present laws are arranged to conform to the new districts and several other changes have been made, as follows: The open season is extended five days to September 25 for district 12 and the ocean districts south of Humboldt County. District 12*a* was made to protect the

salmon in the upper Sacramento River and a close season is given it from May 15 to December 31. This arrangement protects the salmon of the fall run while on the spawning beds and protects the latter part of the spring run. For several years the salmon hatchery at Baird on the McCloud River, the only hatchery which takes eggs from the spring run, has not been able to take a sufficient number of eggs from the spring run to supply the one hatchery and the run is becoming lighter each year. It is believed this arrangement will restore the McCloud River run to something of its former importance. The fishing in this upper portion of Sacramento River (district 12*a*) is carried on with seines which are dragged through the holes, taking practically all the salmon in the river, unless the water happens to be too high to operate the nets. This up-river fishing should in time be eliminated. There is no other stream in which salmon netting is allowed for so great a distance. On the Columbia, for instance, the netting is allowed for only half the distance.

For districts 12 and 12*a* and the ocean district below Humboldt County, a minimum mesh of 5½ inches is provided for salmon nets.

The close season for district 5 (Smith River) is from December 1 to September 30. This season protects the latter third of the quinnat and silver salmon runs and also gives sufficient protection to the steelhead run. The present close season for the river is entirely wrong, the close season apparently being meant for the open season. There is a 6½ inch minimum mesh provision as in the present law. Seines are prohibited.

The close season for districts 7, 8 and 9 is made from December 8 to October 6, inclusive. District 7 takes in the lower netting area of Mad and Eel rivers. This season with the netting limit placed at the east line of township 3 is a better arrangement for all concerned than they have had on Eel River for many years. The salmon and steelhead are, for the present, anyway, given ample protection and as the seines are eliminated and gill nets can only work at night, the sportsman angler will not be interfered with and should be satisfied.

The season for district 6 (Klamath River) is left the same, as it is entirely satisfactory. Daylight fishing from August 1 to September 5 is prohibited on the river. This was to stop the bar fishing which was monopolized by a few daring ones to the dissatisfaction of the others, and it was thought this bar fishing kept the fish from entering the river.

A close season is provided for salmon in district 15 (San Lorenzo River and a portion of Monterey Bay) from September 1 to April 14. This protects the salmon while they are running in San Lorenzo River, where it is wished to establish a run of salmon from the "plants" already made, and it allows trolling in the bay part of the district during the summer run.

The bill provides for the importation of Dolly Varden trout and any species of salmon, other than quinnat salmon, during the close seasons in the State, but they are to be invoiced and tagged and otherwise kept track of. The bill also defines salmon and fixes the steelhead as a trout, so that there should be no trouble in the future, under the law, in showing that the steelhead is not a salmon.

(Senate Bill No. 741. Senator Gerdes.)

Adds a new section, No. 628*h*, to the Penal Code prohibiting the planting in the waters of the State any fish, shell fish, crustaceans or mollusks (except oysters) taken within or without the State, without getting a permit from the Fish and Game Commission. The object of this law is to prevent irresponsible persons from introducing species into our waters that might do great harm.

(Senate Bill No. 755. Senator Flint.)

The bill amends section 635 and includes section 374½ of the Penal Code. Deals with the use of explosives for killing fish and adds a few substances to the list of materials that are considered deleterious to fish or plant life.

(Senate Bill No. 768. Senator Scott.)

This bill amends section 628 and incorporates section 628*g* of the Penal Code, and relates to crabs, spiny lobsters, abalones and catfish. It reduces the close season on red abalones from three months to the one month of February, and prohibits the drying of abalones. It forbids the importation of spiny lobsters taken within ten miles of the California boundary. This provision is designed to protect the lobsters of the Coronado Islands, which it is believed migrate back and forth across the border. It adds fifteen days to each end of the present close season on catfish. The section was also revised to fit the new fish and game districts.

(Senate Bill No. 826. Senator Campbell.)

This bill amends section 628*f* of the Penal Code which relates to clams. The bill provides for a limit of 50 Pismo clams for one calendar day instead of 200 (which is the present law). It also reduces the size limit of Pismo clams from 13 inches in circumference to 12 inches for the minimum size to be taken or had in possession.

This bill also places a limit of 1½ inches minimum size on cockles, hard-shell, or little neck clams when measured in the greatest length, exclusive of the curve of shell.

There is also a provision in this bill which makes it a misdemeanor to ship or transport any clams or crabs which have been taken in fish and game districts 5, 6, 7, 8 or 9. The bill also includes Humboldt County laws relating to razor clams.

(Senate Bill No. 836. Senator Beban.)

The bill adds section 628*i* to the Penal Code and allows the use of Chinese shrimp nets in district 13, which is that part of San Francisco Bay lying south of a line drawn from Hunter's Point to the north end of Bay Farm Island. It provides that all shrimp, fish, or shell fish not suitable for sale as fresh shrimp, shall be returned to the water alive. Section 628 of the Penal Code prohibits the drying of shrimps or the possession of dried shrimps in the State. Until four years ago, Chinese shrimp nets were allowed and it was lawful to dry shrimps but unlawful to export them. It was found impossible to enforce the non-export law and the drying of shrimps was carried on on a large scale

on San Francisco and San Pablo bays. Nine-tenths of the total catch were dried, the shrimp meats extracted, and the young fish and shrimp shells sold for fertilizer. Great quantities of young fish were very frequently taken with the shrimps and this destruction was especially great in upper San Francisco Bay and San Pablo Bay, and was caused in most cases by the boats taking shrimps for drying only. The boats fishing for the fresh shrimp market operated in deeper water so as to take the larger shrimps and in consequence they took fewer small fish. But the boats operating for fresh shrimps in the upper bay, while they did not take so many fish, they did take the young of the more valuable food fish, especially young smelt and striped bass. The boats operating in South San Francisco Bay, although they took shrimps only for drying, did not destroy many fish, and what they did take were of unedible varieties.

After a thorough investigation, the Chinese nets were abolished four years ago and it was expected some less destructive method of taking shrimps would be devised, but such has not been the case, and our markets have been for the most part without shrimps.

In re-districting the State it was possible to set aside the south end of San Francisco Bay for the use of these nets, where it has been shown their destruction to young fish is slight and such fish as are taken are mostly of unedible varieties. While it was not possible to stop the export of dried shrimps before, it will be an easy matter to stop the drying under the present law. With shrimp drying stopped, the shrimp industry is not likely to be more than one-tenth as large as four years ago.

(Senate Bill No. 830. Senator Flint.)

This bill changes only the season on golden trout; the other provisions in section 633 of the Penal Code which relate to golden trout remaining the same. It makes the season open on the first day of August instead of the first day of June, thus making the season open two months later; and the season closes on the first of October instead of the first of September, which makes a month longer open season in the fall.

(Senate Bill No. 852. Senator Gerdes.)

Amends section 630*a* of the Penal Code so as to require wholesale dealers and handlers of fish to render a monthly statement to the Fish and Game Commission, setting forth the amounts and varieties of fish they have received or caught. This law will greatly facilitate the collection of accurate statistical data upon which to base protective legislation.

(Senate Bill No. 972. Senator Flint.)

This bill amends section 636½ restricting the use of the paranzella or trawl net in the waters of the State of California. It does not abolish the use of these nets, however, but simply keeps them outside of the three-mile limit, thus keeping them away from shallow water, bays and lagoons, where certain fish are known to spawn and the young of different species congregate.

In confining these nets to the deeper waters the destruction of unmarketable fish is minimized to a great extent. It would not be

proper to abolish these nets altogether as they can operate in the deeper water off shore where other nets cannot be used and they take fish that otherwise would be entirely lost to us. They furnish the markets with large quantities of fresh sole, sand-dabs and flounders at a moderately low price and tend to lower the price of the scarcer fish to the consumer.

(Senate Bill No. 973. Senator Flint.)

The bill amends section 636 of the Penal Code, dealing with nets and lines. The more important changes and additions are: The use of trammel nets in district 17 (Monterey Bay) is stopped. It has been found that these nets are frequently quite destructive to undersized crabs and that twenty per cent or more of the fish taken in them are rendered unfit for food by the hag fish, an eel-like fish that enters the mouth or gill openings of the fish and eats the contents, leaving only the skin and bones. The trammel nets are allowed in districts 18 and 19 where in the present law they are not allowed within one mile of the shore. A minimum mesh of eight inches is provided. Trammel nets have been allowed in the south because under another bill the paranzella and trawl nets have been eliminated in those waters and the trammel net is the only net to take their place. They are allowed inside the one-mile limit, for that is the only place they can be successfully operated. All told they are a very much better net for inshore fishing than the paranzella or trawl nets. Under a strict interpretation of the present laws the use of crab nets and lobster traps is illegal. The bill makes their use lawful. The bill provides for the use of "diver" gill nets in modified form. It has been found that for several of the "drifts" on the Sacramento the present law forbidding the use of diver nets is too severe. By allowing these nets to be submerged twelve feet and no more it will give the drifts a show at the salmon and striped bass, but will not permit of the former bad feature, where several nets at all depths passed over a drift taking all the fish before them. Recently some severe Federal regulations have been imposed on nets in the Sacramento and San Joaquin rivers and in the bays below, on account of their interference with traffic. If diver nets can be used the boats can pass over them without their being raised. Beach nets are eliminated in most of the State. Their restricted use is provided for only where it seemed necessary in order not to cripple any of the fisheries. The beach nets are very destructive to young fish in the shallow water where such nets are usually drawn ashore and their use should be stopped wherever it is possible to use other kinds of nets. The fishermen can continue to use them in district 19 for smelt only and during the months of September to January, inclusive. They will also be used in districts 9, 11 and 13 where they are the only method now employed in taking bait for the rock cod fisheries. Fyke nets without wings will be allowed in district 12 with a 2¼ inch minimum mesh. Under the present law fyke nets are not allowed in the Sacramento River.

A provision is added to the section by which the Fish and Game Commission can recover fish from isolated ponds left by receding flood waters or to allow fishermen to take them where otherwise they would be a total loss. Another paragraph provides for the sale of condemned legal nets. The bill prohibits the use of nets for taking fish, mollusks or crustaceans in districts 1, 2, 3, 4, 14, 20, 23, 24, 25, 26, 27, 28 and 29.

(Senate Bill No. 975. Senator Flint.)

The bill amends section 628*a* of the Penal Code, and that part of section 634 pertaining to striped bass and shad has been added to it, making it exclusively a striped bass and shad section. The open season in the bill is extended to September 25, which is five days later than the present law. The season for salmon in another bill has been extended to September 25 to conform with striped bass and shad as the three species are running in the Sacramento and the San Joaquin at about the same time and it has been found by experience that the season for each should conform. A uniform mesh has been established for the three species for the same reason. The minimum mesh is made 5¼ inches, which is as small as it can be used and not take bass under the minimum limit, which is three pounds in weight. During the close season for nets, five striped bass per day may be taken with hook and line and during any day of the year five striped bass under three pounds in weight may be taken but may not be shipped or sold. The minimum sale limit remains at three pounds. During the open season for nets, there is no limit for hook and line except the limit for the "undersized" bass. The Saturday and Sunday close season remains as before, as does also the non-export clause.

(Senate Bill No. 1268. Senator Campbell.)

The bill amends section 642, defining the duties of the Fish and Game Commissioners. It makes it their duty to enforce the State laws for the preservation of wild mammals, wild birds, fishes, mollusks, crustaceans and all other forms of aquatic animals and plants, instead of just fish and game as at present. To enable the deputies to better enforce the laws it gives them the right of search, except the clothing actually worn by a person. In other respects the section remains the same.

(Assembly Bill No. 166. Assemblyman Lyon.)

This bill adds a new act to the Penal Code, which prohibits the operation of any kind of a net or seine, except a bait or dip net, within 750 feet from any pier, wharf or jetty in fish and game district 19.

The intention of this bill is to benefit the anglers who fish from the piers along the southern coast.

(Assembly Bill No. 1001. Assemblyman Lyon.)

Amends section 628*c* of the Penal Code. It confines the protection given California whiting, yellow-fin and spot-fin croaker to district 19, the present law being for the State. The bill also provides for the non-sale of these fish in the State.

It also provides a four-pound minimum sale limit for California halibut, a minimum sale limit of 18 inches for barracuda and a minimum weight limit of six pounds for albicore. These weights and size limits

have been considered quite essential in the way of conserving these important food fishes and have been recommended by the fish dealers and fishermen of the southern coast.

(Assembly Bill No. 1533. Assemblyman Ream.)

This bill amends section 637 of the Penal Code which relates to fish ladders. It provides for a sufficient flow of water through the fishway or through or around the dam to allow for the passage of fish or to prevent the destruction of fish below the dam by cutting off the entire flow of water. The bill also provides for a hearing of the owners or parties concerned.

RECENT GAME LEGISLATION.

By Harold C. Bryant.

All hunters and those interested in the conservation of wild life in the State will be interested in the following bills relating to game birds and mammals which were passed by the last legislature and signed by the Governor. All in all, these measures are favorable to game conservation. Only a very few bills consistent with a program of conservation were crowded out, whereas a large number of bills inconsistent with this program were buried in the committees.

Senate Bill No. 1268 amends section 642 of the Political Code. It defines the powers of the Fish and Game Commission and makes it their duty "to see that the laws for the protection and preservation of wild mammals, wild birds, fishes, mollusks, crustaceans, and all other forms of aquatic animals and plants are strictly enforced." Heretofore there has been some doubt as to the legality of the interest taken by the Commission in other than game fish, birds and mammals. This bill also makes it the duty of the Commission to inspect all places where fish and game is held for sale or storage.

One of the most important bills passed was that which prohibits the use of "any animal, or imitation thereof, as a blind" for the purpose of approaching any wild bird, with a view to shooting it or killing it. Although such a law, for several years, has been in force with regard to ducks, yet the killing of geese in this manner has not been prohibited; and hence many market hunters have been able to escape conviction by claiming that they were "bull hunting" for geese when in reality they were hunting ducks. This bill means the death of "bull hunting" in California. (See fig. 39.)

Several bills were passed making the California laws protecting wild-fowl correspond with the new Federal Migratory Bird Law. Hence the open seasons on wild-fowl are now the same as those provided for in the Federal Migratory Bird Law, and all shore birds, with the exception of the Wilson snipe, black-breasted plover, golden plover, and yellowlegs, are protected the year round.

The open season on valley and desert quail (October 15 to December 31) has been made to more nearly correspond with the open season on ducks in order that there will be no excuse for a man to carry a gun during the close season on most game birds. With the increased number of hunters, uniformity in game laws becomes more and more necessary.

The open season on cottontail and bush rabbits is the same as that for valley and desert quail. This act provides that rabbits may be killed at any time by the owner or tenant of premises and by those

Fig. 39. "Bull hunter" working up a shot. A law will go into effect on August 1 which will prohibit all hunting of this kind. In former years it has been possible for a market hunter with the aid of a steer as a blind to slaughter over two hundred ducks or geese with just two shots from a large bore gun.

authorized in writing by the owner or tenant. This, therefore, will give protection to the man who is suffering from the depredations of rabbits.

A tendency toward uniformity in seasons is also to be noted in the new law on doves which provides for the same season (September 1 to November 30, inclusive) throughout the State. The summer open season has allowed the killing of doves during the breeding season, for they breed throughout the summer. The new law will, therefore, prevent the destruction of many nestlings heretofore left to starve because of the death of their parents who were killed "according to law."

Much improvement on the laws relating to deer is to be seen. The killing of spiked bucks is now prohibited. "Any male deer with straight unbranched horns, or antlers, shall be considered a 'spiked buck.'" The following provision is also made in the same law: "Every person taking or killing any deer must retain in his possession, during the open season, and for ten days after the close of the open season, the skin and portion of the head bearing the horns, and must produce this upon the demand of any officer authorized to enforce the fish and game laws." The open seasons on deer have been placed later in the year,

thus guarding against the possibility of destroying deer while their horns are still in the velvet. Under the law now in force the season opens much too early.

Bag limits on most species have been considerably reduced. Senate Bill No. 971 provides bag limits as follows:

Ducks, geese (except honkers and black sea brant), 25 per day, 50 per week; honkers and black sea brant, 12 per day, 24 per week; quail, shore birds, 15 per day, 30 per week; doves, 15 per day; mountain quail, 10 per day, 20 per week; grouse, sage hen, 4 per day, 8 per week; cottontail, bush rabbits, 15 per day, 30 per week.

In the districting bill, provision for a number of new game refuges is made. Certain areas are designated to constitute fish and game districts, and the killing of wild birds or mammals in these districts is prohibited. The only exception to the total prohibition of hunting in these refuges is to be found in district 28 (see fig. 38), where the killing of water-fowl is allowed. This exception was made because the Bear Valley Lake region constitutes the only duck grounds in southern California that are still open to the general public. Provision is made for the killing of predatory species in all of the refuges by securing written permission from the Fish and Game Commission.

Attempts to make longer seasons and larger bag limits on many of the game species, and the attempt to place meadowlarks, blackbirds and robins in the list of game birds met with failure.

BOOKS AND PAMPHLETS RELATING TO CALIFORNIA BIRDS.

The following list of books and pamphlets treating of California birds has been prepared as a help to teachers and others attempting to become better acquainted with the birds of this State. If you have no immediate need for the list, recommend it to your friends, and above all preserve it for future reference.—H. C. BRYANT.

Books.

The following books can be obtained at book stores:

BAILEY, F. M.
1914. Handbook of birds of the western United States (4th ed. revised, Houghton, Mifflin Co., Boston and N. Y.), li, 1–570, 36 pls., 2 diagrams, 601 figs. in text. Price $3.50. (The best handbook on western birds; contains good keys to the species).

PINDLEY, W. L.
1907. American birds (Chas. Scribner's Sons, N. Y.), xvi, 1–256, 127 figs. in text. Price $1.50. (General account of habits of many western birds; suitable for general reading).

MYERS, H. W.
1913. The birds' convention (Out West Magazine, Los Angeles, Cal.), pp. 1–81, 36 figs. in text. Price 75 cents. (Excellent for use as a supplementary reader by the grammar school teacher.)

KEELER, C.
1907. Bird notes afield (2d ed., Paul Elder and Co., S. F.), ix, 1–226, 16 pls. Price $2.50. ("An introduction to familiar birds in their native haunts"; keys and descriptions of birds in appendix).

PAYNE, H. T.
1913. Game birds and game fishes of the Pacific Coast (News Pub. Co., Los Angeles), pp. 1–186, many unnumbered plates. Price $1.50. (Written from standpoint of a practical sportsman and angler; treats of game birds only; not scientifically accurate.)

TORREY, B. B.
1913. Field days in California (Houghton, Mifflin Co., N. Y.), 12, 225, 9 pls. Price $1.50. (Personal reminiscences; many references to the habits of California birds. Thoroughly accurate, and reliable; good style.

WHEELOCK, I. G.
1904. Birds of California (A. C. McClurg & Co., Chicago), xxviii, 1-378, 87 figs. in text. Price $2.50. (An account of California birds interesting to the amateur but not scientifically dependable.)

Pamphlets.

The following bulletins and circulars giving details as to food habits of birds can be obtained free by applying to your congressman at Washington, D. C., or at a slight cost from the Superintendent of Documents, Washington, D. C.

BEAL, F. E. L.
1904. Some common birds in their relation to agriculture. United States Department of Agriculture, Farmers Bulletin 54, pp. 1-48, 22 figs. in text. (Food habits of many California birds.) 5 cents.

1904. The relation of birds to fruit growing in California. U. S. Dept. of Agric., Annual Report, 1910, pp. 241-254. 5 cents.

1907. Birds of California in relation to the fruit industry. Part I, U. S. Dept. Agric., Biological Survey Bulletin 30, pp. 1-100, 5 pls. 20 cents.

1910. Birds of California in relation to the fruit industry. Part II, U. S. Dept. Agric., Bur. Biol. Surv. Bull. 34, pp. 1-96, 6 colored plates. 40 cents.

BEAL, F. E. L. AND MCATEE, W. L.
1912. Food of some well-known birds of forest, farm, and garden. U. S. Dept. Agric., Farmers Bulletin 506, pp. 1-35, 16 figs. in text. (Many references to food of California birds.) 5 cents.

BUREAU OF BIOLOGICAL SURVEY.
1913. Fifty common birds of farm and orchard. U. S. Dept. Agric., Farmers Bulletin 513, pp. 1-31, 50 colored figs. in text. (Beautifully illustrated in color; partly applicable to western birds.) 15 cents.

EDUCATIONAL LEAFLETS.
Published at intervals in Bird Lore by the National Association of Audubon Societies. (Popular accounts of many birds.) Separates obtainable from Secretary Audubon Society, New York City, at 5 cents each.

Miscellaneous.

LIBBY, G.
1912. Bird study in the public schools. California Fish and Game Commission, Bulletin 2, 1-48, 2 figs. in text. (Helpful to teachers; obtainable from Fish and Game Commission, San Francisco. Supply nearly exhausted.)

BRYANT, H. C.
1912. Birds in relation to a grasshopper outbreak in California. University of California Publications, Zoology 11, pp. 1-20. (Shows value of birds as insect destroyers. Obtainable from the University of California Press, Berkeley, California.) Price 20 cents.

1914. A determination of the economic status of the western meadowlark. Univ. of Calif. Publ. Zool. 11, pp. 377-510, pls. 21-24, 5 figs. in text. (Detailed account of food of western meadowlark. Obtainable from University of California Press, Berkeley, California.) Price $1.25.

Local Lists of Birds.

The following faunal and local check-lists of California birds, published by the Cooper Ornithological Club, may be obtained from W. Lee Chambers, Eagle Rock, California.

MCGREGOR, R. C.
1901. A list of the land birds of Santa Cruz County, California. Pacific Coast Avifauna, 2, pp. 1-23. Price 25 cents.

GRINNELL, J.
1912. A systematic list of the birds of California. Pacific Coast Avifauna, 8, pp. 1-23. (A check-list only.)

WILLETT, G.
1912. Birds of the Pacific slope of southern California. Pacific Coast Avifauna, 7, pp. 1-122. Price $1.50. (An annotated check-list.)

TYLER, J. G.
1913. Some birds of the Fresno district, California. Pacific Coast Avifauna, 9, pp. 1–114. Price $1.50. (Applicable to greater part of the San Joaquin-Sacramento Valley. Annotated check-list.)

The following may be secured from the University of California Press, Berkeley, California:

GRINNELL, J.
1908. The biota of the San Bernardino Mountains. Univ. of Calif. Publ. Zool., 5, pp. 1–170, pls. 1–24. (An account of the flora and vertebrate fauna to be found in the San Bernardino Mountains of southern California. Birds are treated at length.) Price $2.00.

1914*a*. An account of the mammals and birds of the lower Colorado Valley, with especial reference to the distributional problems presented. Univ. of Calif. Publ. Zool., 12, pp. 51–294, pls. 3–13, 9 figs. in text. Price $2.40.

1914*b*. A second list of the birds of the Berkeley Campus. Condor, 16, pp. 28–40. (Gives local distribution, status and dates of occurrence; obtainable from Museum of Vertebrate Zoology, Berkeley, California.)

GRINNELL, J., AND SWARTH, H. S.
1913. An account of the birds and mammals of the San Jacinto area of southern California, with remarks upon the behavior of geographic races on the margins of their habitats. Univ. of Calif. Pub. Zool., 10, pp. 197–406; pls. 6–10. Price $2.00.

Ornithological Periodicals.

THE CONDOR.
Bimonthly. Official organ of the Cooper Ornithological Club. W. Lee Chambers, Business Manager, Eagle Rock, California. Price $1.50 a year. (Illustrated magazine of western ornithology; the best bird magazine for those interested in California birds.)

THE AUK.
Quarterly. Official organ of the American Ornithologists' Union. Jonathan Dwight, Jr., Secy., 134 W. Seventy-first street, New York City. Price $3.00 a year. (Rather more technical than popular; treats of North American birds.)

BIRD LORE.
Bimonthly. Official organ of the National Association of Audubon Societies. Bird Lore, Harrisburg, Pennsylvania. Price $1.00 a year. (The best popular bird magazine published in the United States; suitable for school work; has nature-study department.)

N. B. For further bibliographical references to California birds, previous to 1909, see Grinnell's "A Bibliography of California Ornithology." (Pacific Coast Avifauna, 5, pp. 1-166), procurable from W. Lee Chambers, Eagle Rock, California. Price $1.50

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California.

Juiy 15, 1915.

"It is true that the game belongs to the people; but this rightly means the people who are to be born a hundred years hence just as much as the people who are alive today." — Theodore Roosevelt.

WHAT THE BUREAU OF EDUCATION, PUBLICITY AND RESEARCH HAS BEEN DOING.

EDUCATION.

1. Lectures.—A number of illustrated lectures on the following subjects have been given in different parts of the State:

The non-sale of game.
The economic value of birds.
Common birds of California.
The duck breeding grounds of California.
The scientific basis of bird protection.
Methods of game conservation.
The food of common birds.
The food habits of the roadrunner in California.

In addition a series of lectures was given in a course in Advanced Vertebrate Zoology in the University of California during the past semester, the students in which are prospective teachers, and also a series of lectures on game and game conservation was given to forestry students in a course on forest protection.

2. Nature Study.—An attempt has been made to stimulate the teaching of nature study in the public schools.

3. Bulletins.—*California Fish and Game* a quarterly illustrated magazine with the motto "Conservation through education," has been edited and published.

4. Correspondence.—Many inquiries regarding birds and mammals of the State, game laws, etc., have been answered.

PUBLICITY.

1. A series of articles under the general heading "Game Resources of California," has been published in the *San Francisco Call and Post*. The articles have been regularly reprinted in about twenty other newspapers in the State.

2. Newspaper items giving publicity to the work of the Fish and Game Commission and to game and game conservation have been issued.

3. Certain editorials and articles in *California Fish and Game* have given publicity to the work of the Commission.

RESEARCH.

1. Considerable data has been collected regarding the life histories and status of game birds and mammals.

2. Photographic evidence of the work of the Commission and the status of game has accumulated.

3. Food habits of the roadrunner. Eighty-three stomachs of roadrunners have been microscopically examined and the contents tabulated. A complete report on the food habits of this bird in California is nearing completion.

4. Food of ducks. A large number of stomachs of ducks have been examined and the contents identified. A number of stomachs are still at hand awaiting examination.

5. Data relative to the past and present abundance of fur-bearing mammals in this State has been procured. An investigation of the laws on fur-bearers in force in other states has also been made.

6. The breeding grounds of ducks in Alameda and Merced counties have been investigated and censuses taken. The carrying capacity of a small area of marsh near Los Banos, Merced County, is being worked out by systematically taking censuses of the breeding birds.

7. A comparison of the California Fish and Game Commission with the commissions of other states is under way.

8. Circular letters are being sent to deputies to ascertain the present status of

the ring-necked pheasant. A full report will be prepared.

NEW LEGISLATION.

Your attention is called to articles appearing in this issue which give a short resume of the new legislation regarding fish and game. We are glad to report that practically all of the laws relating to fish and game which were passed by the legislature and signed by the Governor are measures which will do much towards conserving the wild life of the State. The new laws go into effect on August 7. A revised book of "California Fish and Game Laws" and game cards will be available before this time.

WHAT IS THE FUTURE OF GAME IN CALIFORNIA?

The optimist is considered a desirable citizen, but too often the knowledge on which an optimist bases his views is insufficient or one-sided. Were the unbiased or scientific attitude more prevalent, there would be less harm done to worthy causes. A case in point: The optimist maintains that game in California is increasing. He encourages all of his friends to think the same. Hence very few realize the importance of more stringent laws. On the other hand, the man with the scientific attitude attempts to collect all possible information regarding the past and present status of game in the State and finds the following facts:

1. That in spite of more game laws, shorter seasons and smaller bag limits, practically every species has decreased in numbers in the last twenty years.

2. The concentration of game into small areas makes the present numbers appear far greater than they should.

The scientist does not, therefore, depend upon hearsay evidence. He bases his conclusions upon a comparison of censuses taken by dependable observers and attempts to base his evidence on *facts*.

There is not a person interested in conservation in California who would not subscribe to the scientific viewpoint which emphasizes the necessity of obtaining *facts* and basing conclusions on absolute evidence. It is extremely necessary that this particular point of view should be applied to all problems connected with the conservation of game. It is to be hoped that future generations will be so trained that they will continually assume this attitude rather than that of many present-day hunters who are attempting to hoodwink people into the belief that game is increasing in order to attain their own selfish ends. The optimist as a member of society is extremely valuable, but may not his conclusions be at times misleading?

NEED FOR ACCURATE INFORMATION

Few of our readers probably appreciate the great need of accurate information regarding those species of birds in which we are particularly interested. It is the lack of just such information which makes estimates as to the past and present abundance of certain species impossible at the present time. Since increased cultivation is going to make statistical information of still greater importance in the future, every opportunity should be taken to accumulate data regarding our game birds and mammals. Professor Spencer F. Baird, one of the early governmental biologists, made this statement a number of years ago: "Accurate statistical information is the one essential foundation upon which protective legislation must rest." If this sentence was a true statement of fact a number of years ago when it was written, it is certainly a still more important statement of fact at the present.

It is unfortunate that many of the men in the best position to furnish accurate information, are men who fail to realize the true value of such information and who seldom take the trouble to write down what they see.

A scientific record of occurrence or of the nesting of some bird is made up of four parts as follows:

1. Name of species or accurate description of bird.
2. Date of observation.
3. Exact locality of observation.
4. Name of observer.

If you wish to take an active part in game conservation, there is hardly a better method than to systematically collect accurate information as to abundance, habits, and breeding of our game birds and mammals. Will you not record in a notebook the observations which you believe will be of interest and report them

to the Bureau of Education, Publicity, and Research of the California Fish and Game Commission? Here the data will be carefully filed and its accumulation will become increasingly valuable.

The Bureau of Biological Survey is attempting to obtain a census of the birds of the United States for the purpose of ascertaining approximately the number and relative abundance of the different species. This exact information is to be used as a basis for determining the adequacy of the present laws for bird protection and whether the several species are increasing or diminishing. The census will need to be repeated for several years before safe generalizations can be made therefrom. Instructions and report blanks are furnished to all those who will volunteer their services in this work. Bird observers in the west and south are particularly requested to cooperate as these facts have not been sufficiently covered in past observations. A census of the game birds breeding in your particular vicinity will be of exceedingly great value to the Bureau of the Fish and Game Commission having this work in charge and also to the United States Department of Agriculture.

LECTURES ON GAME CONSERVATION GIVEN FORESTRY STUDENTS

The Bureau of Education, Publicity and Research has been successful in establishing a course of lectures on game conservation to be given to forestry students in the University of California. The course this past semester was given in connection with the regular course in Fire Protection in charge of Assistant Professor Woodbridge Metcalf. Six lectures were given in the course from April 5 to 16, 1915, as follows:

1. California Birds and Mammals, by Dr. H. C. Bryant, Game Expert, California Fish and Game Commission.

2. The Economic Value of Birds, by Dr. H. C. Bryant.

3. Mammals in Their Economic Relations, by Dr. H. C. Bryant.

4. The Food and Game Fishes of California and Their Conservation, by N. B. Scofield, in charge Department of Commercial Fisheries, California Fish and Game Commission.

5. Past, Present and Future of Game in California, by Dr. H. C. Bryant.

6. Why and How to Conserve California's Wild Life, by Dr. W. P. Taylor, Curator of Mammals in the University of California Museum of Vertebrate Zoology.

As all forestry men in California, by virtue of their position, become deputy game wardens, these lectures will be of service in developing interest and in affording training to those who will later necessarily become guardians of California's wild life. It is very important that all forestry students be taught to recognize at sight the different species of game fish and animals, the economic value of each and the means by which they can be conserved. In addition there is an intimate relation between the two great natural resources—forests and wild life. Each is dependent more or less on the other. Every forest conservationist should have complete knowledge as to the value of birds as protectors of forests due to their destruction of insect pests. And every game conservationist should realize that with the increase of the number of forests there is an increase in game. Co-operative work such as this planned between the State Forestry School and the Fish and Game Commission will help to properly develop the men to whom the administration of our forests and game will ultimately be intrusted.

Plans are now under way to make this co-operative work permanent. Next year a similar course of lectures will be given in one of the regular courses in forestry. At the present time there are not more than one or two universities in the United States which attempt to give a course of training to those who desire to take up the work of a game warden. A short course of lectures such as that given this past year can not be expected to furnish a man with the information necessary to make him an effective game warden. It is to be hoped that interest along this line will so increase that before many years a regular course of training for game wardens will be obtainable at our State University. Should the University of California be far-sighted enough to take up this work it would be a pioneer in the field and doubtless would draw a large number of students from other states. The days are past when political pull was alone needed for obtaining a position as

dignity. The demand is now for trained men. This demand is growing, and to meet it some university will have to establish the proper courses of training.

NATURE STUDY IN THE PUBLIC SCHOOLS.

Although nature study is a compulsory subject in our public schools there are few places where any pretense of adequately teaching this subject is made. In fact, there is little wonder that this should

A few of the larger cities in this State have nature study supervisors, and consequently the work is organized. In many other places no attempt whatever has been made to meet even the law requirement. When teachers are asked to take up nature study work they either complain that they have not had the training which would enable them to properly conduct the work, or that no material is available. That there is a basis for this last complaint, let it be

Fig. 40. A group of yellow-haired, blue-eyed Danish children learning the beauties of their native wild life. The field excursion is a fixed institution of many European countries. (Photograph by C. M. Goethe.)

in the case, for there are very few universities and colleges in the United States which give the proper training to the teacher who desires to specialize in nature study work. Cornell University has made an enviable reputation for itself by emphasizing nature study and many of our best teachers of this subject are graduates of this institution. Interest is growing, however, and it will not be long before there will be a demand for teachers equipped for this part of work.

known that about the only attempt to furnish teachers of this State with proper material has been the publication of a "Bird and Arbor Day" bulletin by the Superintendent of Public Instruction and the publication of a bulletin entitled "Bird Study in the Public Schools" and a series of leaflets for teachers by the California Fish and Game Commission.

The most needed method in the teaching of nature study is the institution of the field trip. Children should be taught to "read a roadside in the same way in

which they read a book." More can usually be learned from the school of out-of-doors than from the usual methods in vogue in our public school system. In Europe they have long emphasized the field trip, and it is not an unusual sight to see teachers with their classes visiting the outskirts of the city to study wild life first hand. (See fig. 40.)

In order to stimulate work along this line (which gives one of the best chances for education in wild life conservation), of Mr. C. M. Goethe, there is every hope that the field trip will become a permanent institution in Sacramento. It is to be hoped that many of the other larger cities in the State will become convinced of the value of this type of education and will institute similar work.

The lack of the proper training which is acknowledged by so many teachers in this State, should be corrected. Each one of the normal schools should offer courses designed to prepare teachers for

Fig. 41. Fifth-graders of Sacramento being taught the fundamentals of game conservation at Southside Park, where many waterfowl are to be found on the lake.

the Director of the Bureau of Education, Research and Publicity of the California Fish and Game Commission has been conducting several field trips in Sacramento. (See figs. 41 and 42.) Classes of fifth-graders have been taken to the city parks and to the outskirts of the city and have been taught the names and habits of the different forms of life encountered. As a result of this work, which was inaugurated through the efforts teaching nature study and in addition the universities should provide a similar training.

This Bureau is planning to furnish teachers throughout the State with the proper sort of material for teaching game conservation along with nature study in the public schools; for no better foundation for permanent game conservation can be laid than that to be found in the proper teaching of the youth of the State.

THE NATIONAL FORESTS AND WILD LIFE

There recently appeared in *Recreation* (May, 1915), an article under the title "The National Forests and Wild Life," by Henry S. Graves, Chief Forester, United States Forest Service. We believe this to be one of the best contributions to conservation literature which has appeared in recent years. Mr. Graves shows his breadth of vision by championing wild life conservation as well as forest conservation. He also shows that his interest goes beyond his immediate duties, for he seeks ways and means of widening the scope of forest conservation.

The following extracts from this excellent article will give a better idea of the worth of the contribution than any words which we can say:

"Forests are more than trees; they are rather land areas on which are associated various forms of plant and animal life. The forester must deal with all. Wild life is as essentially and legitimately an object of his care as are water, wood and forage.

"Conservation means simply intelligent forethought in the collective interest. The wild life question can be settled aright only by adopting as the guiding principle that there shall be realized the largest net total of public benefits.

"I look to the time when the wild life of the National Forest may be handled on sound principles of constructive development and use, such as now characterize the management of the timber, forage, water and land resources. Such an administration would take account of the general needs of the public, the carrying capacity of the land that can be devoted to game, the needs of individual species and individual forests, the coordinating of game administration in different localities and states, the use of the increment, and the intelligent adjustment of wild-life control to the economic use of other sources.

"The first step required in the creation of game refuges is 'a survey of the situation through a game census combined with a determination of the areas most suitable for use as game breeding and

Fig. 42. A class of Sacramento school children on a field excursion. They are being taught "to read the roadside as they are taught to read a book."

feeding grounds.' The next step is a 'knowledge of the habits and requirements of the various kinds of game, the relative adaptability of different areas for the various species, and the carrying capacity of each area when fully stocked.'

"There must be some means of taking care of the natural increase of game after a certain point is reached. Hence any policy of wild-life protection as applied to game animals must sooner or later be accompanied by hunting as a practical necessity.

"The wild life resource is not being properly developed. Present conditions make its handling haphazard, unintelligent, ineffective and inadequate."

We can not help but add this word of appreciation of the work of the forest service in the State of California. The California Fish and Game Commission has always found the administrative officers to be ready and willing to co-operate in every way with the work of the Commission. They have been willing that forest rangers should become deputies of the Fish and Game Commission. They have allowed rangers to make detailed reports as to the status of wild life on their ranges. They have requested that rangers enforce the game laws wherever possible. The rangers themselves have been instrumental not only in enforcing game laws by prosecuting violaters, but in attempting to educate people to the need for game conservation.

Recently they have shown their interest in the Commission's work by strongly advocating the setting aside of large portions of some of the national forests in this State as game refuges.

Hence, the attitude taken by Mr. Graves seems to permeate the whole forest service. Such a body of trained men as compose the forest service united in a strong organization is and will be an important factor in bringing about the proper administration of game.—H. C. B.

CRUDE OIL—A TRAP FOR BIRDS.

Near one of the pumping stations of the Associated Oil Company located at Brito, Merced County, California, there is a large reservoir filled with crude oil. This has proved a trap to many hundreds of birds. The pond is about 50x150 feet and the shining surface of the oil probably appears to the birds flying at night as a pond of water. The moment a bird's feet touch the sticky oil the bird is entrapped, for each successive effort to free itself with its wings only fastens it deeper into the oil. A trip to the pond on May 11, 1915, showed the mutilated bodies of at least three hundred birds. In addition along the shores of the pond there was an incrustation several inches deep made up of feathers and bones of birds.

Almost every species of water bird in that vicinity seems to have been entrapped in this oil pond. Examination showed specimens of the following birds identifiable: canvasback, spoonbill, mallard, baldpate?, geese (species?), green-winged teal, cinnamon teal, mudhen, avocet, black-necked stilt, killdeer, least sandpiper, great blue heron, black-crowned night heron, egret, bittern, belted kingfisher, western meadowlark.

In a small puddle of oil about four feet in length were found six killdeer. The killdeer decoys easily, and doubtless the first bird entrapped decoyed the others to their death.

This circumstance furnishes additional evidence looking towards the solution of the problem confronting paleontologists as to the method by which the bones of prehistoric mammals have been deposited in such numbers in the asphalt of Rancho La Brea near Los Angeles. The incrustation of bones and feathers along the border of this oil pond would doubtless, in time, make similar piles of bones to those found in the asphalt. Hence the theory that many of the birds were entrapped in the oil and that many others met the same fate by being decoyed by those entrapped has much present day evidence to support it.

It is to be hoped that measures will be taken in the near future to prevent further catastrophes of this kind. Such a toll of bird life, and especially of such game birds as the ducks found in the pond, is reprehensible since it could easily be averted with small expense. The matter will be taken up with the Associated Oil Company in the hope that further destruction of wild life may be averted.

MORE GAME REFUGES FOR CALIFORNIA.

At the present time there is much interest shown in game refuges. Many reports come from the east telling of the establishment of chains of refuges throughout certain states. It should be understood by all Californians that our State is not behind in this particular regard.

The 1909 Legislature set aside the Pinnacles National Forest Reserve, situated in the counties of San Benito and Monterey, as a state game refuge. The legislature of 1913 made a large part of the Cleveland National Forest a game refuge. These two refuges taken together comprise many square miles of fine game country. During the past legislative session a successful attempt was made to

which are not obtainable as most of them are unsurveyed. They are as follows:

Lake Merritt, city of Oakland, Alameda County.

Klamath Lake Bird Reservation, Siskiyou County.

Clear Lake Bird Reservation, Modoc County.

East Park Bird Reservation, Colusa County.

Fig. 43. Ducks and geese on a pond at the State game farm. Many of these ducks have nested on the grass-grown banks this past spring.

make the Trinity National Forest a state game refuge and also a large part of the Angeles National Forest. These combined refuges occupy an area practically equal to that of the state of Rhode Island.

There are now 716,240 acres of national forest on which hunting, except for predatory animals, is prohibited.

A list of game refuges located on national forests in California follows:

Cleveland National Forest Refuge, 72,160 acres.

Pinnacles National Forest Refuge, 2,480 acres.

Trinity National Forest Refuge, 38,000 acres.

Angeles National Forest Refuge, 600,000 acres.

In addition there are several other state and federal refuges, the areas of

Farralon Bird Reservation, Farralon Islands off Golden Gate.

Big Basin Game Refuge, Santa Cruz County.

Nor should the national parks of this State, which are Federal game refuges, be forgotten for the Yosemite and Sequoia National parks cover thousands of acres.

Within the next few months over a hundred thousand acres will doubtless be set aside as game refuges under the law enacted in 1913, which provides that "any person, firm or corporation owning and in possession of patented lands in the State of California, embracing an area of not less than one hundred and sixty acres, may transfer by an instrument in writing, duly acknowledged before an officer authorized under the laws of this State to take acknowledgments, to the State

of California, the right to preserve and protect all wild game on the land described therein for a period of not less than ten years." The California Fish and Game Commission has been slow to create such refuges for fear that individuals had a selfish motive in creating a reservation. Since the amendment of the law in 1913 changing the term of years to ten, the danger of promoting this sort of game reservation has been largely done away and the Commission has now under consideration several such propositions.

EARLY NESTING DATES OF DUCKS.

(Attention Deputies!)

It is remarkable how few definite records of the early and late nesting of ducks there are available. Just at the present time if more definite information were at hand California might be instrumental in influencing legislation opposing spring shooting. There is much controversy in the middle west as to the time of breeding and the time of nesting of ducks. Missouri has just passed a law allowing two open seasons on water-fowl—one in the fall from September 15 to December 31, and one in the spring from January 1 to April 30. Such a law in this State would allow the killing of many birds on their nests, as can be seen from a note on the nesting of ducks in the Alvarado marshes of Alameda County to be found in the Life History Notes on page 191. We trust that deputies and every one so situated that they are able to report the finding of the nests of game birds will do so, so that data may be on file in this office which will give dependable evidence as to the extent of the breeding seasons of our game birds.

FUR MARKET IMPROVES.

In spite of the fact that the European war has practically dropped the bottom out of the market for furs, yet some American furriers are advertising widely to obtain certain pelts. The greatest demand appears to be for coyote skins and the very best ones can now be sold for from $2.50 to $3.50. Low prices are quoted for practically all other common fur-bearing mammals. We are glad to see this improvement in the market and we trust that within a few years it will again be restored to normal.

FISH EXPERT TO EDIT "HATCHERY AND FISHERY NOTES."

With this number, the Hatchery and Fishery Notes in *California Fish and Game* will be edited by Mr. N. B. Scofield, in charge Department of Commercial Fisheries. Mr. Scofield's training and wide experience especially fit him for these new duties. A marked improvement in the general character of the material in this department is therefore to be expected.

THE PRACTICAL JOKESTER AGAIN.

The newspaper of a back-country town recently printed the following letter which, it was stated, had been received by a State Game Warden. We can not vouch for the authenticity of the letter, but we are sure that deputy game wardens have received letters just as provoking of smiles. This is the letter:

"Dear ser: I don't wan this sorter licents. I thot i was gettin' a Marridge licents, sumbudy sent me to mr. ——— and sed he would gimme a licents, mandy was so mad when i got back with this here huntin licents she would not have Me. she sed i didn't have sents anuff to git marridge licents so she ups and runs off with bill johnson and i Am in a hel of fixt. i want my munny back unless this hear licents will let me shoot bill johnson.

"yours most truly,

"SAM JACKSON."

CORRESPONDENCE RELATIVE TO "CALIFORNIA FISH AND GAME."

Owing to the fact that the California Fish and Game Commission has a number of district offices with one located at Sacramento, the capital of the State, there is often considerable misunderstanding as to where correspondence should be addressed. Attention is called to the note at the head of the editorial page, where the statement is made that all material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California. It should also be understood that all communications relative to the quarterly magazine *California Fish and Game*, including requests for the periodical, should be sent to the same address or to the head office, 734 Mills Building, San Francisco.

HATCHERY AND FISHERY NOTES.

OUTPUT OF THE FISH HATCHERIES IN 1915.

The hatcheries of the State Fish and Game Commission are having one of the most successful years in their history. The take of trout eggs is approximately twenty-five per cent greater than any year in the history of the Commission. The hatcheries are running at the fullest capacity at which they can operate and still turn out the fish in the best of condition. Many more eggs could have been taken. Steelhead trout eggs were taken at the egg collecting stations on Scott Creek, Santa Cruz County, and at the Snow Mountain station on Eel River in Mendocino County. The eggs taken at Scott Creek are taken to the Brookdale Hatchery on San Lorenzo River where they are held in the hatchery until they have reached the "eyed" stage, so called from the fact that the eyes of the embryo fish at that time as seen through the walls of the egg, are the most conspicuous part of the fish. At this stage of their development they are known as "eyed" eggs and they will stand shipping for long distances, if properly packed. From Brookdale most of the eggs are shipped to the hatchery at Sisson, partly on account of the limited capacity of the Brookdale Hatchery and partly because they can be more economically hatched at Sisson where the pure cold water of the mountains makes a stronger and better fish. The steelhead eggs taken at Snow Mountain station are "eyed" and shipped to the hatcheries at Ukiah, Sisson, and Price Creek. Three hundred thousand eggs are being held at Snow Mountain and 750,000 at the Ukiah Hatchery. There will be steelhead fry to distribute in the State as follows: From the Sisson Hatchery, 5,000,000; from Brookdale Hatchery, 1,000,000; from the Ukiah Hatchery, 1,000,000, and from Price Creek Hatchery, 862,000.

On Lake Tahoe at Taylor Creek 3,500,000 eggs of the black spotted trout were taken and double this number could have been taken had there been room at the hatcheries. These eggs are being handled at the State hatcheries at Tahoe and Tallac. Three million of the eggs will be retained at these hatcheries, 250,000 shipped to Sisson and 150,000 to the hatchery at Bear Valley Lake, San Bernardino County.

Rainbow trout eggs have been taken on Bogus Creek and Camp Creek, tributaries of Klamath River and are being hatched at the Sisson hatchery, 3,295,000 of them.

From the Sisson Hatchery ponds 1,630,000 Lack Leven trout eggs and 1,075,000 eastern brook trout eggs have been taken.

For the first time in over twenty-five years the State is taking rainbow eggs from the Pit River country. One of the first State hatcheries was built on Hat Creek for the taking of salmon eggs but was soon discontinued. The old building still stands but it is in the direct line of the "mud" flowing from the Mount Lassen volcano. The State is taking its rainbow eggs this year on Burney Creek, a tributary of Pit River ten miles from Hat Creek. The run of rainbows on this creek is quite late and is just now beginning late in May. It is the intention to get a supply of these trout for the Sisson Hatchery ponds and to also find out the extent of the run on the creek.

The State is this year operating a hatchery on Bear Valley Lake, San Bernardino County. This lake is stocked with Klamath rainbow trout and the fish have the same appearance and are about the same size as the Klamath trout. Four hundred and fifty thousand eggs were taken and the hatchery will in addition receive 150,000 of the black spotted trout eggs from Lake Tahoe, all of which are to be distributed in the southern part of the State.

All of the trout enumerated above are to be distributed in the streams of the State and they will doubtless be instrumental in making excellent fishing in a couple of years.

The greatest activity of the hatcheries in California is the propagation of Chinook or Quinnat salmon. The California Fish and Game Commission and the United States Bureau of Fisheries carry on the work together, the United States Bureau operating the spawn taking and "eyeing" stations and the State doing most of the hatching. Altogether approximately

40,000,000 salmon eggs were taken during the past winter by the bureau's stations on Mill Creek and Battle Creek in Tehama County, at Baird on the McCloud River and at Klamathon on the Klamath River. Part of the eggs were shipped to the Price Creek Hatchery to be hatched and the fry liberated in Eel River and Mad River. The greater part of the eggs, 30,000,000 of them, were hatched at Sisson for liberation in the Sacramento and Klamath Rivers. The balance were hatched at the Baird Hatchery and at the two stations on Mill and Battle creeks, and nearly all of these have been liberated in the Sacramento. At Sisson 5,000,000 of the fry were put in Klink's and Sisson lakes where they will be held until next fall and then allowed to enter and descend the Sacramento River. Last year 4,000,000 were held in these lakes until fall and in addition to the natural food which was there in abundance they were fed each day. They reached an average length of four inches and were a strong healthy lot.

It has been pretty well established that the majority of the adult salmon coming back to their parent stream are salmon that remained in the stream as fry during their first summer, notwithstanding the fact that the greater majority of the fry descend the river before their first summer. So it is becoming the policy to hold as many of the fry as possible through their first summer.

THE SPINY LOBSTER IN MONTEREY BAY.

Deputy Fish and Game Commissioner P. H. Oyer of Pacific Grove reports the finding of a spiny lobster in Monterey Bay near the town of Seaside. The lobster or crawfish as it is commonly called by the fishermen was taken in a trammel net in sixteen fathoms of water and was 13¼ inches long and weighed 2¼ pounds.

About two years ago one hundred spiny lobsters were put in Monterey Bay where it was hoped they would live and propagate and increase in numbers, and by the aid of additional "plants" to eventually become of commercial importance. The spiny lobster is of considerable commercial importance in southern California but it has never established itself north of Point Conception. It has been believed by many that the spiny lobster would thrive in our northern waters if it could once be "planted" here; that the reason it is not here now is that there is some natural barrier past which it has not been able to come. The probable reason that it is not found north of Point Conception is that the temperature north of that point is too cold for the young or larval stage of the lobster at the hatching time. It may be found that there are a few places where the temperature is favorable enough to allow of its propagating, hence this experiment in Monterey Bay is of great interest and the question yet to be settled is whether they will be able to propagate. One of the Chinese fishermen at New Monterey thinks he found a lot of the young lobsters in a lead pipe which he recovered from the old wreck off Chinatown Point, but none of these young "lobsters" were saved. The point as to whether the spiny lobsters have actually spawned in Monterey Bay needs to be verified. The sheltered south side of the bay has been selected as the place in which they will be most likely to establish themselves. The large lobster found had about doubled its weight in the two years. —N. B. Scofield.

STORM WRECKS FISHING BOATS

The recent wind storm created havoc in the Monterey fishing fleet. The fishing boats were either sunk at their moorings or driven ashore where they were crushed and pounded to pieces by the surf. The buildings of the Sacramento River Packers Association were destroyed and the wreckage piled on the beach with the boats. The buildings are being rebuilt by the American Fish and Oyster Company, at a cost of $65,000. They will be in readiness for the salmon run which usually commences in the fore part of June. The American Fish and Oyster Company and the Western Fish Company will receive salmon at this plant and will prepare them for shipment fresh and will also tierce the larger fish.

The Sacramento River Packers Association will receive their salmon at the wharf and buildings of the Monterey Packing Company. They will ship salmon fresh and also tierce as in the past. The Monterey Packing Company are erecting

a new building for the storage of tierced salmon and to hold part of the sardine pack. The building will contain a modern, well equipped ice plant.

Salmon are taken in Monterey Bay entirely by trolling. Gasoline power boats are principally used, but there are a few sail boats. Each boat trolls with two lines attached to bamboo outriggers. The fish are landed at the packing house wharf and dumped on the floor where they are sorted, and the smaller fish gutted, washed, and iced in boxes. From here they are shipped to different parts of the State, but principally to San Francisco, from which point many are reshipped. The larger fish are mild cured in tierces the process of which is roughly as follows:

The head is removed and the fish gutted and then split into two halves with the back bone removed. After being thoroughly washed and trimmed they are salted with as much salt as will cling to the wetted sides and packed down dry in large casks or tierces. When the tierce is full it is headed up and filled with water through the bung. This process is called mild curing because the brine is not strong enough to keep the salmon unless kept in a cold place. They remain in cold storage until they are to be used. When opened for use the sides are hung up and smoked. They are then ready to eat as they are, or to be cooked. Connoisseurs prefer smoked salmon to the fresh article and it commands a higher price. The great bulk of the mild cured salmon goes to Germany and it goes without saying that the present great war has put a damper on the salmon fishing industry. Most of the salmon taken in California are mild cured.

MONTEREY FISHERMEN'S ASSOCIATION.

The fishermen of Monterey have formed an association with a membership of 330, to be known as the Monterey Fishermen's Association. The object is to get a better price for their salmon. They have usually gotten four cents per pound for their fish, but this year, on account of the war and the resulting slump in the mild cured salmon market, the dealers in fish thought three cents was enough to pay for the salmon. We understand the fishermen through the association have been able to contract their fish as usual at four cents per pound.

CONSERVATION IN OTHER STATES.

A SCHOOL OF FISHERIES.

At the initial meeting of the Pacific Fisheries Society at Seattle there was discussed the proposition of establishing a school or department of fisheries in connection with the University of Washington. The object of this school would be to bear the relation to the fish industry that is borne in their way by the schools of forestry and mining to the basic activities which they represent, and by the agricultural experiment station to industries based upon the products of the soil.

Dr. Smith of the United States Bureau of Fisheries said at that time: "This is a wide field; I do not know of any more promising field in the government service than in the culture of fish. The possibilities of making new discoveries, especially in the line of intensive breeding and selective breeding, are almost inexhaustible. I would expect that a tremendous boom to the fish industry of the entire country would be given by a fisheries school such as this if established here."

The fishing industries on the Pacific Coast are largely centralized in the northwest; hence the University of Washington occupies a strategic position. The location of the school here would permit of close co-operation with the various industrial activities related to fisheries. It is to be hoped that this school will actually be established and that it may help to fill the present need for trained men to conduct research experiments on better methods of breeding fish and administering this resource.

A NEW BIRD SANCTUARY IN CONNECTICUT.

Forest and Stream (February, 1915, p. 82) records the creation of a new bird sanctuary at Fairfield, Connecticut. Ten acres of hilly country have been donated and a rat-proof fence has been erected.

Mrs. Mabel Osgood Wright has been placed in charge of "Bird Craft Sanctuary" and an attractive bungalow has been erected for the caretaker. Berry-bearing shrubs will be planted and artificial feeding carried on. "Although part of the mission of the Bird Craft Sanctuary is to interest and to instruct the people of the surrounding country in regard to its bird life, its primary object is the preservation of native birds, both for the sake of their beauty and song and because of their economic value." No visitors will be allowed during the spring and early summer, lest the nesting birds be disturbed.

MINNESOTA COMMISSION TAKES UP EDUCATIONAL WORK.

A number of state fish and game commissions are becoming convinced of the fact that the development of a public sentiment favoring game conservation is a very necessary item to law enforcement and that education as to the value of and the need for game conservation is more important in the long run than arrests and convictions. The last commission to undertake such work is the Minnesota Game and Fish Commission, which has just undertaken the publication of a new quarterly bulletin called *Fins, Feathers and Fur.*

MISSOURI'S NEW GAME LAW.

Missouri has just passed a new game law. It seems that a number of concessions had to be made by conservationists because of the fact that the whole state commission and all of the laws regarding game were threatened. Consequently Mr. E. T. Grether, editor of the "Rod and Gun" department of the *St. Louis Daily Globe-Democrat*, who has done much to obtain the present laws, believes the new measures to be good ones. Two things are of particular interest; first, absolutely no attention is paid to the Federal Migratory Bird Law, which apparently is considered to be detrimental to the interests of the Middle West; and second, spring shooting is to be allowed, for there is an open season on wild-fowl in fall and another one extending from January 1 to April 30 in the spring.

Mr. Grether writes that careful investigations are being carried on to obtain definite information as to whether any of the ducks are breeding during these spring months.. Photographs showing the condition of the birds, taken by Professor Frank Schwarz of the St. Louis Naturalists' Club and Mr. Grether are to furnish the evidence. The statement is made that all of the ducks so far examined do not contain developing eggs and that the "presence of pin feathers showed them to be in the moulting season and not in the breeding season." Also that ducks no longer breed in Missouri. Could it not be that the spring shooting which Missouri has so long permitted is directly responsible for this lack of breeding birds?

STRINGENT HUNTING LAWS PROPOSED IN MASSACHUSETTS.

An effort is being made in Massachusetts to require licensed hunters to make a sworn statement of game killed each year as a condition to receiving a license the following year, that licenses be not issued to hunters under eighteen years of age, and that hunting on private property, whether posted or not, may be only permissible when the hunter has secured the written consent of the owner, upon penalty of revocation of license.—*Fins, Feathers and Fur*, March, 1915.

A SPORTSMEN'S LEAGUE FOR OREGON.

All of the different sportsmen's organizations in Oregon have united to form the Oregon Sportsmen's League. Each club is entitled to representation according to membership. The working body consists of an executive committee composed of seven members, one from each of the seven game districts of the State. The effectiveness of the various organizations will doubtless be greatly improved through this new consolidation plan. Oregon has initiated several unique methods of administering her game resources; hence this new move will be watched with interest.

LIFE HISTORY NOTES.

A RECORD OF THE NESTING OF THE WOOD DUCK IN CALIFORNIA.

On May 3, 1914, I discovered a nest of a wood duck (*Aix sponsa*) in a sycamore tree on the bank of the Sacramento River about ten miles north of Sacramento. The nest was about two feet in diameter and overhung the water. The hole or entrance to the nesting place was about twelve feet from the ground. The cavity itself was about thirty inches deep and about twelve inches in diameter at the entrance. The nest was composed entirely of down and contained thirteen eggs. The female bird was frightened from the nest.

By keeping the eggs at the proper temperature with hot cloths and engine waste from the engine of my launch they were safely brought to Sacramento. Here they were placed beneath a mallard duck which was making her nest in Southside Park. The eggs were transferred to the nest after dark, and within a few minutes the mallard had returned to her nest. Every one of the thirteen eggs hatched out. Later, however, a number of the birds died. On the Fourth of July last, a fireworks display was held at this park. This frightened a number of the young birds to death. At the present time there are only four live birds, two males and two females. These birds are not pinioned, and they often fly to an adjoining field where there is some wild land and tule. They always return, however, at the regular feeding time.

For a number of years I have known the locality where this nest was found and have noted several trees in which wood ducks nest. It appears to be customary for the same duck to nest in the same tree each year. I have occasionally seen as many as three females endeavoring to take possession of the same hole in a sycamore tree.—GEORGE NEALE.

DO SOME OF OUR MIGRANT DUCKS COME FROM THE GREAT BASIN?

I recently obtained an aluminum band that was taken from a male pintail duck (*Dafila acuta*) killed near Herndon, Fresno County, on January 24 of this year. The band had this inscription on one side: "No. 574" and on the other side: "Notify U. S. Agt., Washington, D. C."

After obtaining possession of the tag, I wrote as requested and received word from the assistant biologist, Alex Wetmore, that the metallic band was placed on the duck September 16, 1914, at the mouth of Bear River, Utah. He also stated that the duck was one that had recovered from the sickness similar to that which affects ducks around Tulare Lake. Does this not show that at least some of our water fowl migrate into California via the Great Basin?—S. L. N. ELLIS.

CINNAMON TEAL AND SPOONBILL NESTING ON APRIL 15.

A trip to some overflow land about two miles north of Alvarado, Alameda County, disclosed the fact that a number of ducks were already nesting on April 15, 1915. The following nests were found:

Species	Number of eggs	Location of nest
Cinnamon teal (*Querquedula cyanoptera*)	11	Sedge
Cinnamon teal (*Querquedula cyanoptera*)	5	Sedge
Spoonbill (*Spatula clypeata*)	10	Pickle weed (poorly concealed)
Spoonbill (*Spatula clypeata*)	10	Sedge (eggs covered with down)

Many mudhens' nests were also found containing sets of from eight to thirteen eggs. The eggs from the above nests were collected and taken to the game farm to be hatched out in order to carry on certain experiments and that more exhibition birds may be available another year. —H. C. BRYANT.

MALLARDS' NEST AT GAME FARM.

On April 15, six mallard ducks (*Anas platyrhynchos*) were nesting on the State Game Farm at Hayward. On the 22d four more had taken up the duties of incubation. Most of the nests were hid

away in the tall grass surrounding the small pond in which the ducks are kept. Complements of twelve eggs were most common. One female refused to leave her nest on any one's approach and attempted to defend her nest by attacking the intruder viciously with her bill. Last year a number of broods were successfully reared, and doubtless greater success will attend the efforts of the superintendent this coming year. The experiments in rearing ducks have been carried on on a very small scale, but nevertheless they demonstrate the fact that mallards can easily be reared in captivity. In artificial propagation we have a solution of the problem as to a means of supplying our markets with game.—H. C. BRYANT.

by some predaceous mammal, probably a rat. This nest was concealed in pickle weed (*Salicornia*) and several dry stems of this same weed composed the nest proper.

No more definite information regarding the benefit to be derived from the Federal Migratory Bird Law is at hand than the remarkable increase of the California clapper rail. This bird, with a limited distribution—the salt marshes around the southern arm of San Francisco Bay—was so reduced in numbers four or five years ago, that the species would doubtless have become absolutely extinct within a very few years. The five-year close season afforded by the Federal Migratory Bird Law evidently came in good time, for the birds are now

Fig. 44. Some downy redheads. These little ducks were hatched in an incubator at the State game farm from eggs procured in the marshes near Alvarado, Alameda County.

CALIFORNIA CLAPPER RAIL BREEDS IN ALAMEDA SALT MARSHES.

On April 3, 1915, I discovered a nest of the California clapper rail (*Rallus obsoletus*) on Bay Farm Island, Alameda County. The nest was hidden beneath a small clump of the common composite, *Grindelia cuneifolia*. No attempt has been made to use building material and the nine eggs were simply laid in salt grass, the crushed-down stems forming the only bedding for the eggs. A bird was flushed from the nest; whether a male or a female, I could not determine.

Another nest found the same day by Dr. Grinnell had originally contained nine eggs, but five of them had been broken

increasing remarkably fast. The species is apparently prolific, for the average set of eggs is nine. A comparison of the numbers to be seen in the salt marshes of Alameda County at the present time with those of four or five years ago shows that the species is fast returning to normal numbers. We trust that this dependable evidence will form a basis for future legislation and will convincingly show the value of a five-year close season. —H. C. BRYANT.

AT THE END OF THE MIGRATION SEASON.

Investigations in the vicinity of Los Banos, Merced County, May 10-14, 1915,

gave evidence that the nesting season for ducks was just beginning. But one duck's nest, that of a cinnamon teal (*Querquedula cyanoptera*), containing the incomplete set of seven eggs, was found. Practically all the ducks seen were in pairs. A few nests of the avocet (*Recurvirostra americana*) and the black-necked stilt (*Himantopus mexicanus*) were found but most of these birds had not begun nesting. Evidence of a very early nesting of the latter species was obtained through the finding of a family of four downy young, two or three days old, on May 12. Fulvous tree-ducks (*Dendrocygna bicolor*) and white-faced glossy ibis (*Plegadis guarana*) were still flying about in flocks.

The following notes as to the occurrence of certain northern migrants which had evidently lingered behind the main flight are of interest.

Whistling swan (*Olor columbianus*). One seen feeding in shallow ponds on several successive days, May 11-13. It appeared to have full powers of flight.

Northern phalarope (*Lobipes lobatus*). Two or three flocks of about a dozen birds each seen. Two birds which had had a wing completely severed from the body by striking telegraph wires, were found.

Wilson snipe (*Gallinago delicata*). One lone one seen on two different occasions in the marsh near Gadwall,

Fig 45. Nest and eggs of a sora rail, Alvarado, Alameda County, California, April 23, 1915. The nest contained fourteen eggs.

Merced County (last seen on May 11), and a pair seen on a muddy pond ten miles west of Madera, Madera County, on May 14. The call heard in both instances helped in identification.

Long-billed dowitcher (*Macrorhamphus griseus scolopaceus*). A flock of eleven seen May 13.

Western sandpiper (*Ereunetes mauri*). A flock of at least two hundred were seen feeding at the edge of a large pond on May 13.

Hudsonian curlew (*Numenius hudsonicus*). One startled from a pond on May 13. It circled around overhead calling loudly.

Semipalmated plover (*Ægialitis semipalmata*). A single bird flushed from a muddy pond ten miles west of Madera, Madera County, on May 14.—H. C. BRYANT.

NESTING OF THE SORA AND VIRGINIA RAIL IN ALAMEDA COUNTY.

While investigating some marshes about two miles north of Alvarado, Alameda County, on April 23, 1915, I came upon the nest of a sora rail (*Porzana carolina*). The nest, composed of the stems of grass and reeds, was placed about eight inches above the ground in tall pickle-weed (*Salicornia*). Fourteen eggs in various stages of incubation were in the nest. One of the eggs formed a second layer. No rails were seen in the vicinity.

On the same day I found one egg of a Virginia rail (*Rallus virginianus*) which had evidently been carried away from a nest by some predaceous animal. At any rate the egg had been broken into and the contents sucked out. A comparison of this egg with those of the sora rail left no doubt in my mind but that this egg furnished evidence that the Virginia rail was nesting in the same marshes.—H. C. BRYANT.

FISH-CATCHING MUSSELS.

The speed with which a mussel can close its valves, when irritated, is vividly illustrated by the accompanying photograph. (See fig. 46.)

These specimens were taken from the bottom of the sailing vessel *Erskine M. Phelps*, a sister ship of the *William P. Frye*, which was recently sunk by the Germans. After lying at anchor in San Francisco Bay for the past winter (1914-1915), the *Phelps* was taken across the bay and put in dry-dock, being raised from the water on the day following the trip across the bay. The bottom was densely covered with mussels (*Mytilus edulis*), and other organisms. The ship is 312 feet in length and 45 feet in width, and on the bottom area about 50 or 60 fish were found trapped by the mussels. The fish were all in the same condition and comparatively fresh, part of the viscera still being present and the flesh firm.

Fig. 46. Mussels which have captured fish. These mussels were taken from the bottom of a ship on San Francisco Bay. The fish are anchovies. (Photograph by E. E. Johnson.)

It is probable that, on the trip across the bay, the ship ran through a school of anchovies (*Engraulis mordax* Girard). Attracted by the edges, or foot, of the mantle of the mussels, many of the anchovies tried to secure a bite, with fatal results. The valves of the mussels were snapped shut with sufficient speed and strength to enclose and hold the more or less pointed head of the fish.—EDWARD F. JOHNSTON.

OPOSSUMS NEAR SAN JOSE CONTINUE TO INCREASE.

Since the appearance of Dr. Grinnell's article on the opossum in the last number of CALIFORNIA FISH AND GAME, this species has been captured in a number of places near San Jose. One of the most interesting of the occurrences is that near Boulder, Santa Cruz County, where about a dozen of these animals have been trapped. The high water in the vicinity of San Jose drove a number of opossums into localities where they were easily caught.

Apparently still another party is partly responsible for the presence of the opossum in Santa Clara County. W. D. Watkins of Campbell, California, brought back in 1900 from Pineville, MacDonald County, Missouri, five opossums. These animals succeeded in gaining their liberty from Mr. Watkins' home, at that time about three miles southeast of San Jose. —I. L. KOPPEL.

WILD LIFE IN RELATION TO AGRICULTURE.

ROBINS AND BLUEBIRDS PROVED FRIENDS OF THE FARMER.

One of the latest bulletins of the Department of Agriculture is that by F. E. L. Beal, assistant biologist, on "Food of the Robins and Bluebirds of the United States."

The conclusion in regard to the robin is that the bird is "omnivorous and feeds upon pretty much every eatable accessible." After an examination of 1,236 stomachs from thirty-two states, the District of Columbia and three Canadian provinces, the conclusion is that the food consists of 42.40 per cent animal matter and 57.60 per cent vegetable matter. As regards the destruction of olives by robins in California, the following statement is made: "Robins rarely attack olives because usually their native food abounds, but where this fails the hungry birds shift about until they find a substitute."

The writer has taken 192 cutworms from the stomach of one western robin collected in Inyo County, California. Furthermore the stomachs of birds collected in strawberry fields near Tres Pinos, San Benito County, where robins were accused of destroying the berries, contained wireworms, beetles, ants, earthworms and a few weed seeds. No evidence that these birds had been feeding on strawberries was found.

"From what is known of the insect food of the varied thrush, it does not appear that the bird is likely to do much mischief by eating useful insects . . . . and the bird does not at present spend the breeding season in a well-settled and cultivated country, and so does not overmuch trespass upon farm products.

"The western bluebird is less migratory than the eastern and does not entirely desert the United States in winter; so its good work is continuous. As insects are active in California in every month, the bird renders a great economic service in the reduction of these pests at this season, for insects that live through the winter are the stock by which the species is perpetuated, and the destruction of a few at this time is equivalent to the death in summer of hundreds or even thousands. That the western bluebird is an eminently useful species is so patent that it hardly needs to be pointed out. Whatever harm fruit growers have suffered from birds, none can be laid at the door of the western bluebird."—H. C. BRYANT.

THE ROADRUNNER OMNIVOROUS.

Three years ago when the California Fish and Game Commission was attempting to determine the economic status of the western meadowlark, the stomachs of a number of other birds about which complaint had been received were collected. The examination of eighty-three stomachs of the roadrunner (*Geococcyx californianus*) has just been completed. Practically all of these stomachs are from birds collected in San Diego County. The

investigation has not furnished evidence that the roadrunner preys upon the eggs and young of the valley quail as has often been stated. On the contrary, this bird apparently feeds almost entirely on insects, lizards and mice. As an illustration of the omnivorous food habits of this bird the stomach contents of a roadrunner taken at Lemon Cove, San Diego County, on January 21, 1913, follows:

Vegetable.

2 seeds (*Rhus integrifolia*).
1 filaree seed with stem (*Erodium* sp.).
2 grass blades.

Animal.

6 beetles (*Amara insignis*).
1 beetle (*Eleodes acuticauda*).
5 beetles (*Microschatia inaequalis*).
5 beetles (*Centrocleonus pilosus*).
8 wireworms (Elateridæ).
12 grasshoppers (*Melanoplus* sp.).
1 Jerusalem cricket (*Stenopelmatus* sp.).
2 spiders (Agalenidæ).
1 scorpion (*Anuroctonus phaiodactylus*).
1 spider egg case.
1 lizard (*Uta stansburiana*).

About ninety per cent of the food for the entire year is made of animal matter and but ten per cent of vegetable matter, largely the seeds of a species of sumac. A full report, giving the results of this investigation, will be published later.—H. C. Bryant.

COTTONTAIL RABBIT REPORTED AS A PEST IN SAN DIEGO COUNTY.

The ranchers of San Diego County have so consistently complained about the depredations of cottontail rabbits that it was found necessary to place a provision in the new law allowing the killing of rabbits when found destroying crops. Mr. G. D. Stead of San Diego writes as follows: "My loss from rabbits was upwards of $350 last season. On the brush side of all fields the grain was eaten off from three to five rods. One piece of wheat was completely eaten off. None to harvest."

Although there is usually a tendency to overestimate the damage caused by a game species, yet the new provision in the rabbit law is a good one and will evidently come as a boon to many ranchers in San Diego County and other places in the State where the cottontail is numerous.

THE EUROPEAN STARLING IN THE EASTERN UNITED STATES.

Every one is familiar with the English sparrow as an example of a foreign bird which has become well established in the United States and which is considered detrimental to man's interests. It appears that a second European bird is now getting such a start in the eastern states that there are grave fears of its becoming a pest similar to the English sparrow. This is the European starling introduced into the United States about twenty-five years ago. Since that time it has extended its range from New York City into the neighboring States of Connecticut, New Jersey, New York, Pennsylvania and Massachusetts. During its migrations it has been found much farther from the original center and has occurred even so far south as the District of Columbia.

The Bureau of Biological Survey reports on the economic value of this bird as follows: "The starling is markedly insectivorous, especially in summer, and preys upon many noxious varieties. In this respect it is to be classed among our useful birds. So far as is known, it has not proved destructive to grain crops, but it is known to be very fond of small fruits, and as it associates in large flocks it is likely to become a pest to the orchardist. In addition, it prefers tree cavities, boxes, or recesses in buildings for nesting sites and thus is brought into direct competition with certain of the useful native birds, more particularly the bluebird, purple martin, white-bellied swallow, house wren, and flicker."

Many of the states where the starling is found have taken protection from the bird in the hope of checking its increase and spread, and the shipment of these birds from one state to another has been prohibited under heavy penalty by an act of Congress. Hence, it can be seen that an endeavor is being made to prevent its becoming too numerous. Nevertheless, there is great danger that the bird, in spite of these acts, will ultimately spread over a large part of the United States. Particular study is being given the food habits of the starling in an endeavor to find out whether it will necessarily be classed as a beneficial or as a destructive bird.

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

March 1 to May 26, 1915.

Offense	Number arrests	Fines imposed
Game.		
Hunting without a license	20	$275 00
Deer, close season, killing or possession	15	475 00
Illegal deer hides	2	75 00
Ducks, close season, excess bag limit	4	50 00
Quail, close season	3	75 00
Doves, close season	4	100 00
Rail, close season	1	25 00
Tree squirrels, close season	4	100 00
Cottontails, close season	4	75 00
Non-game birds	7	70 00
Total game violations	64	$1,320 00
Fish.		
Angling without a license	29	$535 00
Fishing for profit without license	18	90 00
Underweight striped bass	3	60 00
Trout, close season	16	280 00
Trout, excess bag limit; taking other than with hook and line	15	290 00
Young of fish	2	----------
Taking shellfish in Monterey Fish Reservation	1	25 00
Illegal nets; traps	22	2,870 00
Catfish, undersize	2	40 00
Crabs, undersize and female	17	90 00
Clams, undersize and excess bag limit	8	100 00
Abalones, close season, undersize	10	205 00
Lobsters, close season	2	40 00
Pollution of state waters	1	----------
Total fish violations	146	$4,625 00
Grand total fish and game violations	210	$5,945 00

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

March 1 to May 26, 1915.

Fish.		
Striped bass	59	pounds
Trout	215	pounds
Miscellaneous fish	56	pounds
Crabs	305	
Clams	532	
Abalones	76	
Lobsters	7	
Illegal nets and traps	12	
Game.		
Deer meat	700	pounds
Hides	12	
Ducks	6	
Non-game birds	32	
Cottontails	8	
Squirrels (tree)	2	
Miscellaneous	6	
SEARCHES.		
Illegal fish and game	226	

LION BOUNTIES.

Statement of Lion Bounties Paid by Fish and Game Commission from January 1 to May 30, 1915.

	1914	January 1 to May 30, 1915	Total
Alameda			1
Amador			8
Butte	1		30
Calaveras	1		8
Colusa	2		13
Del Norte	4	1	76
El Dorado	1		36
Fresno	1	1	11
Glenn	1		36
Humboldt	46	19	459
Inyo	1	2	4
Kern	5	1	60
Lake	5	5	76
Lassen			6
Los Angeles	5	1	20
Madera	9		20
Mariposa	9	1	32
Mendocino	15	6	156
Merced			1
Modoc			3
Monterey	3	5	53
Mono	2		2
Napa			3
Nevada			3
Orange			4
Placer	3	1	26
Plumas			8
Riverside			13
San Benito	2	1	23
San Bernardino	1		13
San Diego	2		27
San Luis Obispo	7	2	47
San Mateo			1
Santa Barbara	4	1	62
Santa Clara	1		7
Santa Cruz			1
Shasta	9	5	182
Sierra			6
Siskiyou	31	9	221
Sonoma	2		14
Stanislaus			3
Sutter			1
Tehama	5	3	145
Trinity	13	4	229
Tulare	10	2	49
Tuolumne	2	3	33
Ventura	1	3	23
Yuba			3
Totals	204	76	2,261

Lion Bounty Claims.

A bounty of twenty dollars ($20.00) on the scalps of mountain lions is paid by the California Fish and Game Commission on meeting certain requirements. Claim blanks will be sent on application.

FINANCIAL REPORT.

Statement of Expenditures for the Months of February, March and April, 1915.

	February		March		April	
GENERAL ADMINISTRATION.						
Commissioners' traveling and other expenses	$13 00		$77 85		$163 27	
Salaries of administrative assistants	1,045 00		1,045 00		1,045 00	
Traveling expenses of administrative assistants	53 65		79 85		132 40	
Rentals, office and other supplies	295 02		309 75		354 79	
		$1,406 67		$1,512 45		$1,695 46
GENERAL FISH AND GAME PATROL.						
San Francisco Division.						
Salaries of deputies and employees	$2,866 50		$2,936 50		$2,923 00	
Traveling expenses of deputies and employees	953 42		1,175 64		1,226 88	
Rentals, office and other supplies	217 68		177 05		170 94	
		4,037 60		4,289 19		4,320 82
Sacramento Division.						
Salaries of deputies and employees	$2,641 17		$2,510 00		$2,377 00	
Traveling expenses of deputies and employees	1,113 87		1,115 39		1,004 75	
Rentals, office and other supplies	75 27		48 72		306 36	
		3,830 31		3,674 11		3,688 11
Los Angeles Division.						
Salaries of deputies and employees	$875 00		$934 00		$912 00	
Traveling expenses of deputies and employees	177 65		318 82		236 79	
Rentals, office and other supplies	170 20		142 39		135 76	
		1,222 85		1,395 21		1,284 55
Fresno Division.						
Salaries of deputies and employees	$1,047 00		$938 00		$961 67	
Traveling expenses of deputies and employees	555 02		466 06		375 40	
Rentals, office and other supplies	129 32		86 80		89 65	
		1,731 34		1,490 86		1,426 72
Miscellaneous Expenditures.						
Prosecutions and allowances		379 61		339 06		117 00
General printing		314 95				297 12
Total, general administration and patrol		$12,923 33		$12,700 88		$13,129 78

FINANCIAL REPORT—Continued.

Statement of Expenditures for the Months of February, March and April, 1915—Continued.

	February		March		April	
Probable cost general administration and game patrol (60%)		$7,733 998		$7,620 528		$7,877 87
Probable cost general administration and fish patrol (40%)		5,169 332		5,080 352		5,251 91
		$12,923 33		$12,700 88		$13,129 78
FISHERY EXPENDITURES.						
Administration.						
Salaries of superintendent of hatcheries and assistants	$350 00		$350 00		$202 50	
Traveling expenses, superintendent of hatcheries and assistants	146 16		105 05		98 85	
Office and laboratory supplies, etc.	35 95		59 30		42 26	
		$532 11		$551 35		$143 61
Fishery Research and Publicity.						
Salaries	$245 00		$394 20		$567 00	
Traveling expenses	27 25		172 65		158 30	
Supplies, etc.	2 15		205 85		723 13	
		274 40		742 70		1,448 43
Screen and Fishway Surveys.						
Salaries	$100 00		$100 00		$100 00	
Traveling expenses	7 35		103 25		80 15	
Supplies, etc.						
		107 35		203 25		180 15
Fish Transplanting (pack-train, messengers, etc.).						
Salaries						
Traveling expenses					$13 50	
Repairs and supplies					16 04	
						29 54
Fish Distribution (car and messengers).						
Salaries	$100 00					
Messenger allowance and traveling expenses	13 50				$1 95	
Repairs			$249 95		4 47	
Supplies, general expense, etc.	1 90				39 65	
		115 40		249 95		46 07

Fish Patrol (launches, etc.).						
Salaries	$242 50		$220 00		$244 00	
Messenger allowance and traveling expenses	79 73		43 45		80 55	
Repairs	4 42		294 20		21 15	
Supplies (oil, etc.)	75 35		63 16		157 55	
		402 02		630 81		503 25
Sisson Hatchery.						
Salaries	$1,435 50		$1,686 19		$1,603 34	
Traveling expenses			2 75		6 30	
Construction and repairs	3 55				8 25	
Fish food and ice for meat	163 14		242 30		333 25	
General supplies and expenses	23 37		95 99		63 09	
		1,625 56		2,027 23		2,014 23
Tahoe and Tallac Hatcheries.						
Salaries	$10 00		$10 00		$386 66	
Traveling expenses					56 45	
Construction and repairs					5 80	
General supplies and expenses					51 00	
		10 00		10 00		499 91
Price Creek Hatchery.						
Salaries	$261 67		$275 00		$242 50	
Traveling expenses	55 70		4 50		41 50	
Construction and repairs	31 30				4 00	
General supplies and expenses	92 31		113 48		168 69	
		440 98		392 98		456 69
Ukiah and Snow Mountain Hatcheries.						
Salaries	$282 00		$294 12		$342 50	
Traveling expenses	29 90		21 58		30 85	
Construction and repairs			21 36		6 95	
General supplies and expenses	8 70		66 51		97 95	
		320 60		403 57		478 25
Wawona Hatchery.						
Salaries						
Traveling expenses						
Construction and repairs						
General supplies and expenses						

FINANCIAL REPORT—Continued.

Statement of Expenditures for the Months of February, March and April, 1915—Continued.

	February		March		April	
Sisson Hatchery Auxiliary Stations.						
Salaries	$282 00		$660 00		$482 50	
Traveling expenses	28 10		77 10		42 00	
Construction and repairs	268 83		156 85			
General supplies and expenses	21 23		30 95		68 95	
		600 16		924 90		593 45
Scott Creek and Brookdale Hatcheries.						
Salaries	$185 50		$284 00		$280 00	
Traveling expenses	4 00		2 30		60	
Construction and repairs	70		4 60		9 58	
General supplies and expenses	19 64		74 59		71 76	
		209 84		365 49		361 94
Bear Valley Hatchery.						
Salaries					$165 16	
Traveling expenses					21 50	
Construction and repairs						
General supplies and expenses					10 15	
						196 81
Miscellaneous Expenditures.						
Printing and lithographing fishing licenses, notices, application blanks, etc.						35 76
Angler's license commissions and refunds		269 10		263 40		423 90
Market fishing license commissions				43 25		199 50
Crawfish inspection		35 00		129 03		100 00
Total fishery expenditures		$4,942 52		$6,900 91		$7,981 49

Game Expenditures.

Hayward Game Farm.						
Salaries	$200 00		$200 00		$200 00	
Traveling expenses	1 20		6 50		1 80	
Rent	37 50		37 50		37 50	
Construction and repairs	46 35		16 00		86 75	
Feed for birds	76 55		54 20		71 60	
General supplies and expenses	34 53		105 28		57 22	
		$396 13		$449 48		$454 87
Game Research and Publicity.						
Salaries	$233 50		$358 80		$629 40	
Traveling expenses	35 05		100 68		9 85	
Supplies, etc.	50 23		317 54		1,074 40	
		318 78		777 02		1,713 65
Miscellaneous Expenditures.						
Printing and lithographing of hunting licenses, notices, application blanks, etc.		662 00		277 40		1,291 70
Hunting license commissions and refunds		380 00		420 00		220 00
Mountain lion bounties		$1,756 91		$1,923 90		$3,680 22
Total game expenditures						
Grand total of all expenditures		$19,622 76		$21,525 69		$24,791 49
Total of fish expenditures		$10,111 852		$11,981 262		$13,233 40
Total of game expenditures		9,510 908		9,544 428		11,558 09
Grand total		$19,622 76		$21,525 69		$24,791 49

Summary of Expenditures for the Months of February, March and April, 1915.

	February	March	April
General administration, salaries, traveling expenses, rentals, supplies, etc.	$1,406 67	$1,512 45	$1,695 46
San Francisco District, salaries, traveling expenses, rentals, supplies, etc.	4,037 60	4,289 19	4,320 82
Sacramento District, salaries, traveling expenses, rentals, supplies, etc.	3,830 31	3,674 11	3,688 11
Los Angeles District, salaries, traveling expenses, rentals, supplies, etc.	1,222 85	1,395 21	1,281 55
Fresno District, salaries, traveling expenses, rentals, supplies, etc.	1,731 34	1,490 86	1,426 72
Hatchery administration, salaries, traveling expenses, rentals, supplies, etc.	532 11	554 35	403 61
Fishery research and publicity, salaries, traveling expenses, supplies, etc.	274 40	742 70	1,448 43
Screen and ladder survey, salaries, traveling expenses, supplies, etc.	107 35	203 25	180 15
Fish transplanting, salaries, traveling expenses, supplies, etc.			29 54
Fish distribution car, salaries, traveling expenses, supplies, etc.	115 40	249 95	46 07
Fish patrol launches, salaries, traveling expenses, supplies, etc.	402 02	630 81	503 25
Sisson Hatchery, salaries, traveling expenses, supplies, etc.	1,625 56	2,027 23	2,014 23
Tahoe and Tallac Hatcheries, salaries, traveling expenses, supplies, etc.	10 00	10 00	499 91
Price Creek Hatchery, salaries, traveling expenses, supplies, etc.	440 98	392 98	456 69
Ukiah and Snow Mountain Hatchery, salaries, traveling expenses, supplies, etc.	320 60	403 57	478 25
Wawona Hatchery, salaries, traveling expenses, supplies, etc.			
Sisson Hatchery Auxiliary Station, salaries, traveling expenses, supplies, etc.	600 16	924 90	593 45
Scott Creek and Brookdale Hatcheries, salaries, traveling expenses, supplies, etc.	209 84	365 49	261 94
Bear Valley Hatchery, salaries, traveling expenses, supplies, etc			196 81
Game Farm, salaries, traveling expenses, rentals, supplies, etc.	396 13	449 48	454 87
Game research and publicity, salaries, traveling expenses, supplies, etc.	318 78	777 02	1,713 65
Prosecutions and allowances	379 61	339 06	417 00
Hunting license commissions and refunds	662 00	277 40	1,291 70
Angler's license commissions and refunds	269 10	263 40	433 90
Market fishing license commissions		43 25	169 50
Crawfish inspection	35 00	129 03	100 00
Mountain lion bounties	380 00	420 00	220 00
Printing and lithographing	314 95		332 88
Totals	$19,622 76	$21,525 69	$24,791 49

Balances February, March and April, 1915.

	February 1		March 1		April 1	
Balance in State Treasury.						
Fish and Game Preservation Fund	$90,392 35		$80,627 11		$76,649 66	
Support and Maintenance Hatcheries Fund	16,376 09		13,871 12		13,018 14	
		$106,768 44		$94,498 23		$89,667 80
In Bank.						
Fish and Game Preservation Fund	$370 00		$1,638 97		$2,651 60	
Support and Maintenance Hatcheries Fund	1,060 00		2,330 00		7,640 00	
		1,430 00		3,968 97		
					$10,291 60	
Less amount for market fishing licenses, 1915-1916					7,300 00	
						2,991 00
Total belonging to fiscal year 1914-1915		$108,198 44		$98,467 20		$92,659 40
Less monthly bills		19,622 76		21,525 69		24,791 49
Balance		$88,575 68		$76,941 51		$67,867 91

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CONTENTS.

	Page
GAME CONDITIONS IN GREAT BRITAIN *vs.* CONDITIONS IN CALIFORNIA — *Carl Westerfeld*	3
THE EFFECT OF STRYCHNINE SULPHATE ON CALIFORNIA VALLEY QUAIL — *C. C. Pierce* and *H. T. Clegg*	11
FISHING AT SANTA CATALINA ISLAND—ITS DEVELOPMENT AND METHODS — *Dwight G. French*	14
SCIENCE AND PROGRESS IN THE PROTECTION OF FOREST, FISH AND GAME — *Chas. C. Adams*	19
CONTRIBUTIONS TO THE LIFE HISTORY OF THE PACIFIC COAST EDIBLE CRAB — *F. W. Weymouth*	22
EDITORIAL	28
HATCHERY AND FISHERY NOTES	38
CONSERVATION IN OTHER STATES	44
LIFE HISTORY NOTES	46
WILD LIFE IN RELATION TO AGRICULTURE	49
COMPARISON OF THE LEADING FISH AND GAME COMMISSIONS OF THE UNITED STATES	51
REPORTS—	
Violations of Fish and Game Laws	52
Seizures and searches	53
Financial report	54

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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

GAME CONDITIONS IN GREAT BRITAIN VS. CONDITIONS IN CALIFORNIA.

By Carl Westerfeld, Member California Fish and Game Commission.

The San Francisco Examiner, in its editorials entitled "Breeding Game in Scotland," published July 31, 1915, and "New Proof of Our Game Law Folly," published November 3, 1915, commends to the "prayerful consideration of the Fish and Game Commission the study of game conditions under the Scottish practice of breeding and killing game."

We were already familiar with game conditions prevailing in Great Britain, but in order to refresh our memories we took some pains to review the game laws and conditions of that country.

We are indeed surprised that the Examiner, which has hitherto so severely criticized the gun clubs and game preserves of California, should now suggest to Governor Johnson the upsetting of "the entire project of conserving game for the few and substituting for it the honest, well-established method of conserving it for the many," as practiced in Scotland. The preserve system which the Examiner has so bitterly condemned flourishes to a greater extent in Great Britain than in any other country. There a few of the nobility and millionaires own all the land where game is found and only these men and their friends are permitted to hunt.

On examining the "game conditions under the Scottish practice of breeding and killing game" we find at the very outset that the game laws of Scotland and those of the United States rest upon entirely different foundations. In America the wild game belongs to the people in their sovereign capacity and is not subject to private dominion to any greater extent than the people through the legislature may see fit to make it. (Geer vs. Ct., 161 U. S. 519; Ex parte Maier, 103 Cal. 476; Kellogg vs. King, 114 Cal. 388.)

On the other hand, in Great Britain there has been grafted much legislation upon the rules of the common law "which up till the end of the eighteenth century was framed for the preservation of deer and game for the recreation of persons of fortune and of preventing persons of inferior rank from squandering in pursuit of game, time, which their stations in life required to be more profitably employed." (XI Encyclopedia Brittanica, 11th edition, p. 440.) The right to take game was made to depend on the social rank of the person. Even now in Scotland the right to hunt is theoretically reserved to persons who have inherited that unknown quantity, a "ploughgate of land." (Scots Act 1621, c. 31); and in Ireland qualifications by estate are necessary for killing game and keeping sporting dogs. (Irish Act 1698, 8 Will. III, c. 8.)

In Great Britain, where the right to take deer and game is not in the crown by prerogative, or by franchise (*ratione privilegii*) in the grantee of the rights of chase, park or free warren, which are anterior

to and superior to those of the owner or occupier of the lands over which the privilege has been granted, "the right to take or kill wild animals is treated as a profit incidental to the ownership or occupation of the land on which they are found, and there is no public right to take them on private land or even a highway, nor is there any method known to the law where the public at large, or an undefined body of persons, can lawfully acquire the right to take wild animals *in alveno solo*." (XI Ency. Brit., 11 ed., p. 440; The Laws of England [The Earl of Halsbury] Vol. 15, p. 212.)

To preserve this right to the owners or occupiers of the land the most drastic trespass laws have been enacted in Great Britain. A trespasser on another man's land in pursuit of game renders himself both criminally and civilly liable. In a criminal action the penalty for trespassing on the land of another in pursuit of game is very severe; if done in the day time the offender is liable to a penalty of £5. If the trespassing is in search of game or rabbits in the night time the maximum penalty on a first conviction is imprisonment with hard labor for not over three months; on a second, imprisonment with hard labor not over six months. For the first or second offense the conviction is summary, *i. e.*, without trial by jury, subject to appeal to a court of session, but for a third offense the offender is tried on indictment and is liable to penal servitude from three to seven years, or imprisonment with hard labor for two years. If the offenders assault or offer violence by firearms or offensive weapons they are liable to be indicted, and on conviction punished to the same extent as in the last offense (The Night Poaching Act 1828, 9 Geo. IV, c. 69). In 1844 the above penalties were extended to persons found by night on highways in search or pursuit of game. If three or more trespass together on land by night, or destroy game or rabbits, and any of them is armed with firearms, bludgeon or other offensive weapons, they are liable to be indicted, and on conviction sentenced to penal servitude, from three to fourteen years, or imprisonment with hard labor for two years (Act of 1828, Sec. 12; Act 1831, Sec. 34). The Game Act of 1831 gives lords of manors and privileged persons certain rights to appoint gamekeepers with special powers to protect game in districts over which their rights extend. (Sec. 13, 14 and 16.) It is not necessary in Great Britain for the owner to summon a public officer in order to make an arrest for trespassing in pursuit of game. This may be done by *the owner or occupier of the land, his servants or gamekeepers.* Even in the Night Poaching Act of 1844, which applies to highways, the arrest of offenders is made by owners, occupiers and their gamekeepers.

The term "game," as defined by the Night Poaching Act of 1828 and the Game Act of 1831, includes pheasants, partridges, red grouse, bustard and hare. Deer are considered even more sacred than game. It is a *felony* to hunt or kill deer in enclosures, in forests, chases or purlieus, or in enclosed land where deer are usually kept, or after a previous conviction to hunt or kill deer in the open parts of the forest. (Larceny Act 1861.)

These are the laws which the EXAMINER so prayerfully commends to the consideration of the Fish and Game Commission. Does the EXAMINER advocate the adoption of similar laws in the State of California? Is this the EXAMINER's "honest, well established method of conserving (game) *for the many?*"

As a result of these laws game and deer in Great Britain are most carefully protected by the owner or occupier of the land. Pheasants, partridges and other game birds and deer are reared artificially in great numbers, very much in the same manner as poultry and cattle are reared in California. The laws of Great Britain guard the interests of the land owner in game and deer so well against poaching that it is to the financial interest of the owner to protect it.

In many parts of Great Britain the importance of the sporting rights of an estate now more than counterbalance its agricultural value, and enormous sums are annually devoted to the artificial production of game. Taking all contingent expenses into consideration, the average cost of every head of game killed (this does not include deer) may be taken as not less than three shillings. A hand-reared pheasant can scarcely be brought to the gun for less than seven or eight shillings; and these birds in particular—the partridges and wild ducks to a lesser but steadily increasing extent—are reared in tens of thousands every year. (XXIV Ency. Brit. 11 Ed. p. 995.)

The nobleman who kills over 1,000 brace of grouse or hand-reared pheasants in a single day, or 200 stags in a season, can not, of course, eat them all himself, and in order to lessen the tremendous cost of artificially rearing and protecting game and of maintaining his hunting preserve, he sends to the market the game he can not eat. Because of the value of the game to the land owner and his right to control the hunting of it on his property, limit laws are unnecessary in Great Britain. Every owner permits only such hunting as will not impair his breeding stock, just as cattle men or poultry raisers in California kill or ship only the surplus cattle or chickens to market and retain a sufficient number as breeding stock.

It is true as said in the EXAMINER "that although Scotland is a small and well populated country" and "although game has been hunted and killed in Scotland for hundreds of years" certain species of game are still plentiful. This is due to artificial propagation and the fact that owing to the rigid trespass laws only the owners or occupiers of the land are permitted to hunt. It is not true, however, that under the Scottish practice the "common people" are entitled to hunt, or that the game is preserved for them, nor is it true that the wild fowl is still plentiful in Scotland, or anywhere else in Great Britain. The natural wild fowl have been almost exterminated in Great Britain—"the districts are unhappily few and far between where even a moderate bag of edible wild fowl can be made nowadays." (XXIV Ency. Brit., 11 ed., p. 998.) Wild fowl are migratory and can not be kept upon any man's land except to a slight extent when raised artificially. The deer and game birds of Scotland too would have been exterminated long ago were they not so carefully preserved for the land owner and occupier, *i. e.*, the nobleman and the millionaire.

"Any person before he shall in Great Britain take, kill or pursue or aid or assist in any manner in the taking, killing or pursuing by any means whatever * * * any game * * * or any deer shall take out a proper license to kill game," costing £3 or $15.00. (Game License Tax 1860.) Gamekeepers and servants who assist the wealthy sportsmen as gun bearers, beaters, etc., must under this act have a game license, but even including all these only 68,000 game licenses are issued annually in Great Britain and Ireland and the population of Great Britain and Ireland is 45,250,000.

In California with a population of 2,500,000 over 164,000 hunting licenses costing only $1.00 apiece are sold annually.

If hunting licenses were sold in Great Britain and Ireland in the same proportion to the population as they are in California almost 3,000,000 licenses would be sold there annually.

In California one out of every fifteen men, women and children hunts, while in Great Britain and Ireland only one out of every 665 has that privilege. In other words, in proportion to the population, forty-four times as many people hunt in California as in Great Britain and Ireland. Evidently the "common people" do not have much opportunity to hunt under the Scottish system. Do these figures show that in California game is being conserved for "the few" and that in Great Britain it is being conserved for "the many"?

Neither grouse shooting nor deer hunting in Scotland is a poor man's sport. Mr. Grimble in his work "Deer Stalking and the Deer Forests of Scotland," p. 89, says: "In the two counties of Argyle and Inverness only and leaving Mr. Winans out of the calculation, there are a dozen deer forests which let at a total of £25,000!—an average of over £2,000 each per year. For practically two months' sport, a rental of £250 a week, or over £40 a day is paid. This sum does not include attendants' expenses, which sum sometimes amounts to very nearly as much again." And Lord Lovat in "Grouse in Health and Disease," p. XVIII, says: "It has been estimated that the approximate value of the grouse moors in Scotland is about £1,000,000 a year in gross rent, and in England not less than £270,000."

The total area of Scotland is 19,069,500 acres. Of this more than one-fifth, 4,000,000 acres, is devoted to deer forests, and these 4,000,000 acres are owned by less than seventy individuals, most of whom belong to the nobility and all of whom are extremely wealthy. The Duke of Sutherland alone owns 257,000 acres of deer forests in Scotland, the Duke of Fife 110,000 acres, and Lord Lovat 101,000 acres. Nobody is permitted to hunt on any of these lands without the consent of the owners. Less than seventy men therefore control all the deer hunting of Scotland. These men carefully conserve the game on their lands and but comparatively few men are invited to hunt. For example, the Duke of Fife, the owner of the Forest of Mar, consisting of 110,000 acres, limits the hunters to five a day and does not permit more than 200 stags per year to be killed. (Grimble, Deer Stalking and the Deer Forests of Scotland, p. 172.) So in the smaller forest of Glencalley by Glenilsa, consisting of 3,000 acres, only one person per day is permitted to hunt during a limited season of two months, and the kill of stags averages about twenty-seven a year. (*Ibid.*, 209.) The author of the book, Mr. Grimble, in the preface, himself laments that he can no longer hunt in certain forests because the former owners (his friends) have died. He says: "* * * woe is me that I am unlikely ever again to spy their splendid corries, for, alas! the four kind friends who respectively held them in the days when I first wrote have all joined in the great majority."

It is the same with the hunting of grouse, pheasants, blackcock, partridge and all other game birds. Immense tracts of land which are rigidly preserved are owned by a few nobles and millionaires. Only they and their friends are permitted to hunt to the utter exclusion of the inferior classes.

The EXAMINER in its editorial of November 3, charges that "the deer are preserved for the rich sportsmen friends of the Fish and Game Commission." Let us examine the facts. The official railroad map of California, issued by the Railroad Commission of the State of California, showing the National Forest Reserves, shows that these reserves include the districts where the best deer hunting in California is to be had. They include nearly all of Trinity County and a large part of Del Norte, Siskiyou, Shasta, Modoc, Lassen, Plumas, Sierra, Nevada, Placer, Eldorado, Alpine, Tuolumne, Mono, Mariposa, Madera, Fresno, Inyo, Tulare, Kern, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Benito, Orange, Riverside, San Diego, Monterey, San Bernardino, Lake, Mendocino, Glenn, Tehama, and Humboldt counties.

Fig. 1. Map of California showing National Forests, in which, with the exception of those forming game refuges, hunting is free to all. The National Forests in California comprise 19,000,000 acres. (Courtesy United States Forest Service.)

In all there are almost 19,000,000 acres of land included in these forest reserves and there are over 21,000,000 acres of government land outside of the reserves, making over 40,000,000 acres of the best deer country in the State of California, owned by the United States government, upon which any citizen may hunt by procuring a license costing one dollar. None of this land is, or ever can be "preserved for the rich sportsmen friends of the Fish and Game Commission." As a matter of fact there are very few acres in the State of California which are preserved for the purpose of hunting deer. A few clubs exist for that purpose in the counties of Marin and San Mateo, but elsewhere in this state they are practically unknown.

The people of California have, therefore, government lands equal to twice the area of Scotland on which to hunt deer, besides all the land which is privately owned and upon which hunting by the public is permitted.

Practically the same method of conserving game as that practiced in California is followed throughout the United States.

In estimating the whole number of hunters in the United States we arrive at some astonishing results. In an article in the Saturday Evening Post of November 13, 1915, it is said:

"Covering the year 1913—the latest available in view of the conflicting dates of the several fiscal years—the association's report (American Game Protective and Propagation Association) shows that two million three hundred and twenty-five thousand shooting licenses were issued by the several states. It is estimated that in the year 1915 this number will exceed two million five hundred thousand. It is concluded that a million men hunt who are exempt from license requirements. In addition to these legal exemptions it is likely that more than a million men evade the law and hunt illegally.

"Taking figures and estimates combined, it seems fair to suppose that there are five million hunters in the United States. This is also about the estimate made by the Department of Agriculture.

WHAT AMERICAN HUNTERS SPEND.

"Of shotgun ammunition alone more than a billion shells are sold in the United States each year. (Retailing at about $30,000,000.) There are thirty-five million clay birds or targets shot at every year in America (costing the shooters about $500,000). There are five hundred thousand shotguns and rifles sold to sportsmen in America each year (bringing easily from $10,000,000 to $15,000,000). There are forty-five hundred gun clubs in the United States. On the whole, the outdoor sportsmen of America who do not confine their enjoyment altogether to proxy sports or commercialized sports—the men who at least have smelt powder—make a very respectable nucleus of military possibility. Rather let us call it efficient business possibility.

"The capitalization of American outdoor sports runs into very large figures. When we come to transportation, hotel bills, guides, equipment and so on, as required by the sportsmen tourists who hunt and fish, we run into very many millions of dollars."

There can be no question but what the training these men obtain in the pursuit of game develops the very qualities which make good soldiers. This training has been in the past and will be in the future a tremendous asset to the United States in the event of war. Colonel Roosevelt in the introduction to his work on "The Deer Family" at page 24 says:

"There are many sides to the charm of big game hunting; nor should it be regarded as being without its solid advantages from the standpoint of national character. Always in our modern life, the life of a highly complex industrialism, there is a tendency to softening of the fibre. This is true of our enjoyments; and it is no less true of very many of our business occupations. It is not true of such work as railroading, a purely modern development, nor yet of work like that of

those who man the fishing fleets; but it is pre-eminently true of all occupations which cause men to lead sedentary lives in great cities. For these men it is especially necessary to provide hard and rough play. Of course, if such play is made a serious business, the result is very bad; but this does not in the least affect the fact that within proper limits the play itself is good. Vigorous athletic sports carried on in a sane spirit are healthy. The hardy out-of-door sports of the wilderness are even healthier. It is a mere truism to say that the qualities developed by the hunter are the qualities needed by the soldier; and a curious feature of the changed conditions of modern warfare is that they call to a much greater extent than during the two or three centuries immediately past, for the very qualities of individual initiative, ability to live and work in the open, and personal skill in the management of horse and weapons, which are fostered by a hunter's life. No training in the barracks or on the parade ground is as good as the training given by a hard hunting trip in which a man really does the work for himself, learns to face emergencies, to study country, to perform feats of hardihood, to face exposure and undergo severe labor. It is an excellent thing for any man to be a good horseman and a good marksman, to be able to live in the open and to feel a self-reliant readiness in any crisis. Big game hunting tends to produce or develop exactly these physical and moral traits. To say that it may be pursued in a manner or to an extent which is demoralizing is but to say what can likewise be said of all other pastimes and of almost all kinds of serious business. That it can be abused either in the way in which it is done, or the extent to which it is carried, does not alter the fact that it is in itself a sane and healthy recreation."

The chief complaint of the EXAMINER seems to be that game is not as plentiful in our markets as in the markets of Europe. Game possibly would be plentiful in our markets if the shooting were limited as in England to the owner or occupier of the land on which it is found, but this would mean the adoption of the European system under which only the wealthy can hunt. Instead of five million hunters in the United States there would be about one-fiftieth of that number or 100,000. The poor man under the European conditions can not afford to hunt.

A supply of game in the markets would be of no particular benefit to the poor man because under ordinary conditions he could not afford to buy it. In thickly populated countries game always has been and always will be a luxury. It costs more than other meat because it is not so plentiful and is more expensive to raise. If at any particular time game has cost less than beef it was due to some unusual condition which was only temporary.

In California every effort has been made by the present Fish and Game Commission to have people engage in the business of raising game for the markets. One of the principal reasons for the establishment of the State Game Farm at Hayward was to instruct people how pheasants and other game birds could be raised artificially. Since the establishment of the game farm hundreds have been raising pheasants for the market and these birds can now be had in any first-class restaurant in San Francisco. In 1913, owing to the efforts of the Fish and Game Commission, the "Bowman Act" was passed, which permits the raising and sale in California of all kinds of hand-reared game. For several years past reindeer meat has been offered for sale in the markets and restaurants of San Francisco. Several men are now engaged in raising deer in captivity and hope some day to supply our markets with venison, but this will take time and the expenditure of much money. For example, under the "Scottish practice of breeding and killing game"

enormous sums have been spent in the raising of deer. A witness who was examined before the Royal Commission testified:

"I have planted 8,000 acres with twenty-four million trees, and that I am going on with as quickly as the season permits;

"I have put up more than seventy-six miles of my own internal fences, and I have joined with my neighboring proprietors in putting up more than thirty-four miles of march fence.

"I have made 473 miles of open drains; I have made over twenty miles of carriage road and more than eighteen miles of pony tracks and walks; the whole outlay I have made during twelve years has been £180,000, or an average of £15,000 a year spent entirely in the county!" (Grimble, "Deer Stalking and the Deer Forests of Scotland," p. 91.)

From this testimony it would appear that the raising of deer for sport or for the market is no small undertaking.

In no place, not even in Scotland, have game breeders had any success in hand rearing grouse or quail. The moors on which they are found in Great Britain are protected against trespassers, the birds are fed and the vermin are killed. All this is done there by the owner or occupier of the land and until the right to take or kill wild animals in this country is treated as a profit incidental to the ownership or occupation of the land on which they are found, no owner or occupier will bother himself much about the protection or propagation of the game on his land.

While private preserves often serve a most useful purpose and should be encouraged within reasonable limits, it would be a great misfortune if they increased to such an extent that all the available hunting ground fell into the hands of a few very wealthy men, as it has done in Scotland under the "Scottish practice of breeding and killing game."

In the United States millions of dollars are spent annually in the pursuit of game and millions of men find renewed health and strength in the exercise and outdoor life which it entails. The prohibition or curtailment of field sports is highly undesirable, both from the standpoint of economics and of health.

Furthermore, the great army of hunters forms a nucleus from which in time of need an army of soldiers could be recruited for national defense. For, as Colonel Roosevelt has said:

"The qualities that make a good soldier are in large part the qualities that make a good hunter. Most important of all is the ability to shift for one's self, the mixture of hardihood and resourcefulness which enables a man to tramp all day in the right direction and when night comes, to make the best of whatever opportunities for shelter and warmth may be at hand. Skill in the use of the rifle is another trait; quickness in seeing game, another; ability to take advantage of cover, yet another; while patience, endurance, keenness of observation, resolution, good nerves, and instant readiness in an emergency, are all indispensable to a really good hunter * * *.

"It is utterly foolish to regard proper game laws as undemocratic, unrepublican. On the contrary, they are essentially in the interests of the people as a whole because it is only through their enactment and enforcement that the people as a whole can preserve the game and prevent its becoming purely the property of the rich who are able to create and maintain expensive private preserves. The very wealthy man can get out hunting anyhow, but the man of small means is dependent solely upon wise and well executed game laws for his enjoyment and the sturdy pleasure of the chase.

"The game should be conserved so that it shall continue to exist for the benefit of all lovers of nature and to give reasonable opportunities for the exercise of the skill of the hunter whether he is or is not a man of means."

THE EFFECT OF STRYCHNINE SULPHATE ON CALIFORNIA VALLEY QUAIL.

By C. C. Pierce, Senior Surgeon, and M. T. Clegg, Bacteriologist, United States Public Health Service.

For the past several years the United States Public Health Service has been conducting a campaign for the eradication of ground squirrels, in co-operation with the California State Board of Health. This work is being carried out under a state law, and on account of plague infection existing among California ground squirrels.

One of the methods used to destroy squirrels is to distribute poisoned barley over infected lands during the dry season. Barley is the only grain used for this purpose and was selected because the squirrels take it readily, while birds are not particularly attracted by the barbed grain, the spines not being removed in the cleaning process.

The government formula and method of preparing this poisoned barley are as follows:

Whole barley (recleaned)	18 pounds
Strychnine sulphate	1 ounce
Soda (bicarbonate)	1 ounce
Saccharine	1 dram
Thin starch paste	1 pint
Corn syrup (Karo or equal)	2 ounces

Dissolve the strychnine in hot water; thicken with starch to about the consistency of thin soup. Dissolve the soda in one-half pint of hot water and add a little at a time to the poisoned starch until effervescence ceases; then add the syrup and saccharine, mix well and apply to the grain, stirring constantly until the poison is evenly distributed throughout, and the grain is thoroughly dry.

This formula is particularly advantageous on account of the fact that the bitter taste of the strychnine is delayed for several minutes and squirrels can pick up and place in their cheek pouches a considerable quantity before any bitter taste is noted; it is then too late for the squirrel to get rid of the poison, as enough of it has been absorbed through the mucous membranes of the cheek pouches to kill the animal.

Extensive experience with this type of poisoned barley has shown an efficiency far ahead of any other type of poisoned grain tested. Young or half-grown squirrels have, in most instances, been practically exterminated and the percentage of adults or full-grown squirrels destroyed is far higher than with other types of poisoned grain used.

At various times the effect which the extensive use of this poisoned grain might have upon valley quail has been questioned. The officers and employees engaged in squirrel eradicative work have never observed any mortality among quail as a result of the poisoned grain. In order to give a definite and scientifically proven answer to the State Fish and Game Commission, the following experiments were carried out at the Federal Laboratory, San Francisco, to determine the minimum lethal dose of strychnine sulphate for the California valley quail, and further to determine what effect the poisoned barley, distributed under the direction of the United States Public Health Service for the destruction of the ground squirrels (*Citellus beecheyi*) might have upon the quail. It was found that of four quail tested, the minimum

lethal dose of strychnine sulphate given subcutaneously was four milligrams for each 100 grams of body weight.

TABLE NO. 1.

Showing the Minimum Lethal Subcutaneous Dose of Strychnine Sulphate for Quail Compared with Guinea Pigs and Ground Squirrels

Subject	Weight in grams	Dose in milligrams	Dose in milligrams per 100 grams body weight	Result
Quail No. 1	150	2	1.3	No symptoms.
Quail No. 2	145	4	2.7	No symptoms.
Quail No. 3	148	4	2.7	No symptoms.
Quail No. 4	147	6	4	Death.
Guinea pig No. 1	381	4	1.05	Convulsions; death.
Guinea pig No. 2	201	4	2	Convulsions; death.
Guinea pig No. 3	362	2	0.5	Convulsions; death.
Squirrel No. 1	450	2	0.4	Convulsions; death.
Squirrel No. 2	530	0.5	0.09	Convulsions; recovery.

It will be noted that the amount of strychnine reckoned by body weight fatal for quail No. 4 was ten times greater than the fatal dose for squirrel No. 1 and forty times greater than that which produced convulsions in squirrel No. 2.

FEEDING EXPERIMENTS. USING PURE SULPHATE OF STRYCHNINE.

Forced feeding was carried out. This experiment, of course, does not show the amount of strychnine that would be fatal were they fed under natural conditions, as a certain amount of the strychnine was absorbed through the upper membranes during the process of feeding. Four quail were used. Six milligrams for every 100 grams of body weight produced convulsions but not death.

FEEDING EXPERIMENTS. USING POISONED BARLEY.

The barley used in these experiments was obtained from the contractor furnishing poisoned barley for the Public Health Service, mixed according to the government formula and containing 10 milligrams of strychnine sulphate to each 2.9 grams of weight, or 70 grains of barley. Four quail, the heaviest weighing 170 grams and the lightest weighing 153 grams, were fed varying amounts of the barley. The feeding time in one case was ten minutes. This quail consumed 70 grains of barley containing 10 milligrams of strychnine. Another consumed 140 barley grains containing 20 milligrams of strychnine during a period of twenty-four hours, and one consumed 280 barley grains containing 40 milligrams of strychnine during a period of forty-eight hours. In none of the quail were there any symptoms of poisoning.

In order to test the toxicity of the barley, four squirrels were fed the following amounts:

19 grains of barley containing 2.7 milligrams of strychnine.
30 grains of barley containing 4.3 milligrams of strychnine.
33 grains of barley containing 4.7 milligrams of strychnine.
40 grains of barley containing 5.7 milligrams of strychnine.

TABLE NO. 2.

Test to Determine the Amount of Poisoned Barley Fatal to Quail, Compared with That Fatal to Squirrels.

Animal	Weight in grams	Number of grains of barley	Amount of strychnine sulphate (in milligrams)	Time consumed in feeding[1]	Results
Quail A.....	153	70	10	10 min.	No symptoms.
Quail B.....	173	140	20	24 hrs.	No symptoms.
Quail C.....	157	?	?	24 hrs.	No symptoms.
Quail D.....	168	280	40	48 hrs.	No symptoms.
Squirrel A....	455	40	5.7	1 hr.	[2]Convulsions; death.
Squirrel B....	440	33	4.7	1 hr.	[3]Convulsions; death.
Squirrel C....	445	30	4.3	2 hrs.	Convulsions; death.
Squirrel D....	425	19	2.7	10 min.	[4]Convulsions; death.

[1]"Time consumed in feeding" designates the time occupied in giving the amount of strychnia indicated. Quail A had been starved for 48 hours; Quail B, C and D were fed on non-poisoned grain before receiving the poisoned barley. Cages were then cleared of all food and a definite number of grains of poisoned barley were placed in the feeding pans.

[2]Convulsions occurred within thirty minutes after the poisoned barley was pouched by the squirrels, and death within two hours.

[3]Death occurred in one and a half hours.

In each case convulsions and death occurred within a period of two hours after administering the barley and in each case the barley was reclaimed from the pouch of the squirrel after death, showing what had already been proven, that strychnine is rapidly absorbed through the membranes of this organ.

CONCLUSIONS.

(1) California valley quail may be fed under natural conditions relatively large amounts of strychnine sulphate without showing toxic symptoms.

(2) The minimum lethal dose by subcutaneous injection is four milligrams per 100 grams of body weight.

(3) The California ground squirrel (*Citellus beecheyi*) is very susceptible to strychnine sulphate; .09 milligrams per 100 grams of body weight produced convulsions.

(4) Nineteen grains of barley containing 2.7 milligrams of strychnine sulphate, when retained in the pouch of the ground squirrel, proved fatal.

(5) Poisoned barley as used for ground squirrel eradication does not cause the death of California valley quail under natural feeding conditions.

FISHING AT SANTA CATALINA ISLAND—ITS DEVELOPMENT AND METHODS.

By Dwight G. French.

Probably at no other place, up to the present time, has the art of angling been given such a distinct and carefully worked out technique as at Santa Catalina Island, off the coast of Southern California, where, in the last fifteen years, its growth has been most rapid. The story of its development forms a very interesting chapter in the history of the piscatorial art.

In 1886 the waters off Catalina Island contained vast numbers of game fish. At that time there was on the island but one boatman, "Mexican Joe" who, with a large dory, took passengers for hire. All fishing was done with hand lines. It was necessary to go only two or three miles from Avalon, the town on the island, to make a good catch of tuna, albacore, yellowtail, white sea bass, and many other game fish. As Mexican Joe's trade increased others began to take up the occupation, but hand lines and row boats prevailed for many years, and little or nothing was done with the fish caught. Later a power boat, or launch, was introduced to tow boatmen, passengers and rowboats to and from the fishing grounds. As all fishing at Catalina is done by trolling, with the exception of black sea bass and rock bass, the more enterprising boatmen began to build their own launches and fish directly from these, trolling their lines behind.

In 1898 a grand leader and true sportsman, Charles F. Holder, founded the Tuna Club. With the founding of this club, rods and reels began to supplant the hand lines, for the Tuna Club offered prizes for the largest game fish landed on specified tackle.

Two distinct types of rods were specified, one known as heavy tackle, a wooden rod not shorter than six feet nine inches in length and weighing not more than sixteen ounces, the other known as light tackle, a rod not shorter than six feet over all, the tip, not including the butt, to weigh not more than six ounces. The line specified for the heavy tackle rod was a twenty-four strand line with a breaking strain of forty-eight pounds, that of the light tackle a line of nine strands with a breaking strain of eighteen pounds. Here also might be mentioned the tackle known as "three-six," the rod not to be longer than six feet over all and butt and tip to weigh not more than six ounces. The line is of six strands and breaks at twelve pounds. This latter class is not so generally used as the two described above.

No specifications were laid down with regard to reels. The reels first used had straight, stiff handles and leather thumb-drags, these drags being the only means of checking a fish's run. The reels held six hundred feet of the specified line. Following straight stiff-handled reels came an adjustable friction drag attachable handle. Its purpose was to do away with the leather drag as much as possible and act also as a saver of lines, for inexperienced anglers would often, in their excitement, press too heavily on the leather drag and so break the line. The drag handle once being set, all that remained to be done was to hold the handle until the fish had spent its run, then by a pumping process the line could be reeled in, ready for another rush of the fish. A 900-foot reel replaced the 600-foot one, for often 600 feet of line was not enough.

The 900-foot reel, with its adjustable friction drag handle, has been further improved by putting in a spring catch, so that the handle is caught or released at will. When the catch is released, the handle being caught, one can use both hands to pump and it is not necessary to use the handle except to reel in the line. Another type of reel has gained much favor, but as yet is not in general use. This reel combines the improvements described above, and in addition has a handle that locks at any position, and also a drag that can be adjusted to a given tension at any instant.

The seining and gill-netting operations of market fishermen at Catalina Island for a number of years past have so depleted the fish that it has become necessary for the boatmen who angle for sport to find some means to entice the fish to strike other than trolling the bait behind the boat in the old manner. The more naturally a bait can be made to act in the water the greater is the possibility of a fish striking. The yellowtail and the tuna are the most desirable of the game fish, consequently some improvement on the old method of trolling a sardine or flying fish had to be devised. When the yellowtail and tuna are feeding, sardines can be seen jumping on the top of the water and flying fish making their torpedo-like flight. Two very ingenious methods have been contrived for "jumping" the bait, the kite and the sled. The kite is the oldest and by far the most effective in its particular use, namely, in skipping the bait (a flying fish) for tuna fishing. (See sketch.) The originator of kite fishing is Captain George Farnsworth, one of the oldest boatmen and most experienced fishermen at Catalina. He claims to have used this method since 1909, but kept it a secret, pledging all of his anglers to secrecy before allowing them to use it, and then permitting its use only under his supervision and many miles away from chance spiers. In 1911 his secret leaked out through some unscrupulous anglers who, it is said, had given their word of honor not to divulge it, so that now the method is in more general use.

Two persons are required in the use of the kite, the boatman manipulating the boat and kite, the angler the bait. From 500 to 1,000 feet of kite line are necessary. The method of putting out the kite is as follows: The boatman puts the kite in the air and plays out about 200 feet of line or more, as circumstances require; a similar cord from ten to twenty feet in length is then tied to the kite line, and to the free end of this cord is tied a short piece of line that will break at about twelve pounds strain. The end of this line is then fastened to the wire leader of the angler's line. The boatman and angler then play out line together. In this manner the bait can be carried to any distance from the boat that is desired, the kite holding all lines clear of the water and allowing only the bait to touch the surface. On hooking a fish the light line between the kite line and the angler's line breaks, thus letting the angler free to fight the fish and the boatman to reel in the kite.

In the past three or four years several styles of kites have been tried and used. The first constructed were paper box-kites, but these proved of little value; they either pulled too strong and raised the flying fish from ten to fifty feet in the air, or else at the critical moment ceased to fly. Next followed the home-made kite, constructed of cloth, either thin muslin or silk. No glue is used in these kites, consequently they

are little affected by water. Two kites are necessary, one that can be used in a heavy wind, and one that can be flown in a very light breeze or by the speed of the boat alone. These kites must be so constructed and have such lifting powers that the bait is seldom raised more than three feet above the surface of the water. One can scarcely imagine the perseverance and patience Captain Farnsworth used in experimenting and constructing a kite to meet all weather conditions and yet be under perfect control, and one can not help lauding him, especially if they have had the pleasure of working with him one summer.

Often at Catalina tuna can be seen schooling on the surface when not a breath of wind is stirring. At these times it is practically impossible to get a strike by other means than with a kite or sled. At such times the no-wind kite, as I will call it, must be used. Most fishing launches at Catalina have a maximum speed of between seven and ten miles per hour, and going at full speed a kite, if properly constructed, will fly, but then almost directly astern of the boat. With proper maneuvering of the boat by turning, and the kite flying high enough, the bait can be carried off to the side and skipped over the school of surfacing fish. Only for a short period can this be done, however, for during the turning period the kite will begin to drop, and one must go ahead on it to cause it to raise. Let the slightest breeze come up and the no-wind kite will fly as nicely as could be wished. From the sketches (Fig. 2) it can be seen that there are no lines in the water, only the bait on the surface. With experience this bait can be made to skip and jump in the school of tuna, and to all appearances to act as if it were making frantic efforts to escape. The skipping is accomplished by raising and lowering the rod in a jerky manner. Tuna seem unable to resist these actions of the bait and often three or four will make their lightning-like strike for it. It matters not whether the bait is on the surface of the water or three feet above, they seem possessed with the mad desire to have the bait.

I have said nothing of the arrangement or location of the hook in the flying fish. This is very essential, for often the flying fish is struck and the tuna not hooked. The hooks used are of a distinct type, being about three inches long and one and one-half inches across the throat. The point of the hook points toward the shank to allow free hooking and yet as far as possible prevent unhooking. The using of two hooks is not advisable as often the tuna becomes bridled and the chances of landing him are thus lessened. One hook placed within two inches of the flying fish's tail, and the wire leader run through the body so that the fish will pull straight and by the head, seems to work the best. When feeding on flying fish a tuna generally strikes the head, it being necessary for them to swallow the fish head first so that the wings will not interfere. When the flying fish is used with the kite, however, the tail is nearest the water; consequently the hook is placed there.

When there is sufficient wind so that it is not necessary to run the boat to keep the kite flying, different tactics are used than when there is no wind. For illustration, let the wind be blowing from the west and the boat be traveling north, then the kite will be on the starboard or right side of the boat. A school of tuna being sighted, the boatman runs on the west side opposite the school, puts his helm to port and

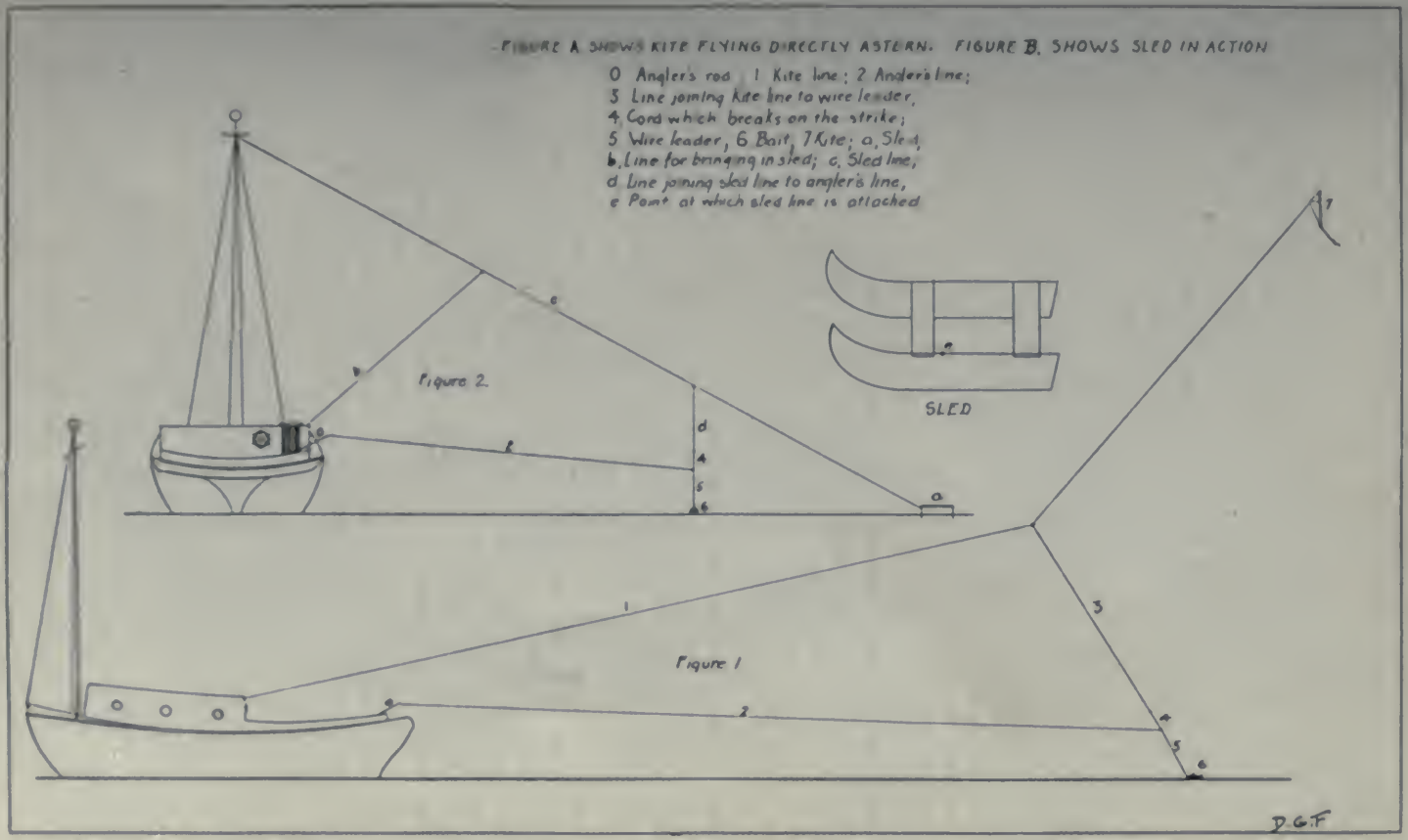
FIGURE A SHOWS KITE FLYING DIRECTLY ASTERN. FIGURE B. SHOWS SLED IN ACTION
0 Angler's rod 1 Kite line; 2 Angler's line;
3 Line joining kite line to wire leader,
4 Cord which breaks on the strike;
5 Wire leader, 6 Bait, 7 Kite; a, Sled,
b. Line for bringing in sled; c. Sled line,
d Line joining sled line to angler's line,
e Point at which sled line is attached
Figure 2.
SLED
Figure 1
D.G.F

Fig. 2. Diagram showing the use of kite and sled in tuna and yellowtail fishing at Santa Catalina Island.

stops. The wind being sufficiently strong to hold the kite up, the bait remains directly over the school; then by jerking the rod the bait can be made to dance.

I have given but two illustrations of the use of the kite, one under favorable conditions and one under poor. On paper these illustrations look easy to follow, but in actual use they are difficult to work out. Kite fishing is one of the best, most interesting and surest methods of causing tuna to strike; but only an experienced boatman and angler can manipulate the kite with continuous success.

The sled has been in use but a little over three years. Just who the originator was I can not say, there being some dispute. Its coming was not kept secret, neither was so much comment made at its initial appearance. The first year it was little used, as boatmen were rather skeptical of its value. The scarcity of yellowtail served, however, to give it prominence and showed that it had qualities that were at first underestimated. Only a general building plan of the sled can be given, because of all the sleds in use at Catalina no two are built alike. Each boatman seems to have his own idea as to the best. The sled has two wooden runners ranging from three to five feet in length and from six to ten inches in depth and about three-quarters of an inch in thickness. These runners are curved up at the front end, making about a 45° angle with the horizontal. At the rear end they are cut away slightly to leave as little wake as possible. The runners are held together by two braces, the under side of these braces being cut away toward the rear so as to assist in sliding over obstacles and through the water.

Using the sled does not require as much skill or experience as the kite, though two persons are necessary to work it to advantage. A line with a breaking strain of from 90 to 120 pounds and from 100 to 200 feet in length is run from the mast of the launch to the side of the sled, the sled thus pulling from the side (see sketch). When the launch is started the friction of the water on the sides of the runners causes them to act as a rudder, and the sled instead of running astern of the boat runs off to the side and a little abaft of the beam. By tying the sled-line to a different point on the runner the sled can be made to run more nearly parallel or more astern of the launch as desired. With a new sled the point at which it will run best is found by trial and the line always made fast to this point afterwards. A mast of reasonable height must be used, or the sled-line does not make a sufficiently large angle with the water. It can easily be seen that the taller the mast, the longer the sled-line can be and consequently the farther from the boat the sled can be made to run. The sled, like the kite, keeps all lines out of water. At some point about two-thirds the length of the sled-line from the boat a short piece of heavy cord is tied to the sled-line and on the free end of this cord is fastened a short piece of line which will break at about ten pounds strain. The light line is then tied to the wire leader of the angler's line. A hooked fish breaks the light line, leaving the sled on the sled-line and the fish on the angler's line. The bait used is the flying fish which, when skidded along on top of the water, the yellowtail will strike. For inshore fishing over or near kelp beds the sled has no equal, as the curved-up runners of the sled slide smoothly over the kelp without fouling. The yellowtail is an inshore fish and is seldom taken more than a half mile

off shore. For this reason the sled is best adapted for yellowtail fishing, the kite seldom if ever being used. The sled works best in smooth water or in water which is only slightly rough. In rough water or heavy swells it has a tendency to jump or dive, and as the speed of the boat is increased, these actions are more pronounced. When running in the trough of the sea the rolling of the boat and mast cause severe strains on the sled and sled-line. To eliminate this as much as possible a spring or heavy elastic cord is inserted at the mast. Because of rough water the sled is seldom used for tuna fishing, the kite being superior for all weather conditions met with in this branch of the sport.

In this article on the fishing methods in vogue at Catalina Island, an effort has been made to show something of the evolution that has taken place in salt water fishing at the southern island—an evolution which has brought the sport from the crudeness of hand-line days to the perfected art of kite and sled fishing with rod and reel and to a better utilization of the fish caught.

SCIENCE AND PROGRESS IN THE PROTECTION OF FOREST, FISH AND GAME ANIMALS.*

By Dr. Chas. C. Adams, Forest Zoologist.
New York State College of Forestry, Syracuse, N. Y.

I. INTRODUCTORY.

I have recently come to this State from the Middle West, where the sportsmen of New York State have the reputation of being among the most progressive, intelligent and public spirited men in the propagation, preservation and legal protection of fish, game and other wild animals. They have led the entire nation in their high standards of sportsmanship.

It is therefore with much pleasure that I have this opportunity to speak to such a representative audience upon a subject of so much importance and of so much interest to me personally. I wish to urge the desirability and necessity of investigating the forest, fish and game animals if we are to use intelligently the very exceptional animal resources which this State possesses. No other state equals or surpasses it in these features.

II. URGENCY OF INVESTIGATION OF THE STATE ANIMALS.

I take it that the most important practical problem is to execute all plans to the limit of our knowledge and to the best of our ability. This is so self evident that I will not discuss it. The problem of next practical importance is to acquire new knowledge—an equally difficult matter. There are many reasons for this. There are fewer workers with the proper technical training, the personal rewards are generally less, and the investigator must not only wrestle with the problems he is attempting to solve, but he must also persuade others to furnish him with the means and support for his investigation, because he can seldom devote himself solely to investigation and support himself and family on the side or incidentally.

*A paper presented at the annual meeting of the New York State Fish, Game and Forest League, Utica, N. Y., December 10, 1914, and before the Anglers Association of Onondaga, Syracuse, February 8, 1915.

What are some of the problems awaiting solution in this State? As far as fish are concerned, listen to Dr. T. H. Bean, fish culturist of the State Conservation Commission, the best informed man on New York fish and a man whose reputation as a fish culturist is not surpassed in America. He says (16th Ann. Rep. Forest, Fish and Game Comm., pp. 137–138, 1911), "It is unfortunate but true, that the life of the inland lakes of New York, numerous and important though they are, is as little known as that of some of our remote possessions. New York ranks among the greatest of the states in the value of its fisheries and its waters contain undeveloped resources of unusual importance. We know little more than the names and spawning seasons of our common fishes. The interrelation of species in their effects, one upon the other, is almost a sealed book to us. In fish culture the state is occupied with only about thirty species, and these are under observation for the most part of the spawning season only. [There are about 150 species of food and game fishes in the State.] What is going on in the open waters of our streams and on the bottoms of our lakes is little understood, and yet it is of vital importance to the success of our work. The State ought to devote more time and money to the study of its natural aquatic resources. Such investigations would yield unexpected and most gratifying returns. It is time that the importance of the fisheries to the general public as well as to the angler was fully recognized and acknowledged."

When, as a new-comer in the State, I endeavored to learn what detailed studies of the fish had been made in our lakes and streams, I was soon impressed very forcibly with the truth of Dr. Bean's remarks. Much the same condition holds also for the game, fur-bearing and other forest animals. I do not wish to belittle the good work already done, but certainly we have no detailed study of the animals comparable with that which has been devoted to the geological survey of the State, nor with the detail that we have from some other states.

III. SAMPLE PROBLEMS NEEDING INVESTIGATION.

The following may be given as examples of some of the problems which need investigation:

1. What is the maximum crop of game and food fish which should be produced in our lakes such as in Lake George, Chautauqua Lake, or Oneida Lake?
2. How many grouse and quail should we secure from a given area of woods?
3. How many deer should we be able to secure from 500 acres of hardwood or coniferous forest?
4. To protect trees from insects, how many woodpeckers would it be desirable to have nesting in a square mile of forest?
5. What is the status of the red squirrel? Does the good it accomplishes balance the harm done?
6. Should garter snakes and water snakes be killed?
7. What is the extent, character of bottom, depth of water on the best breeding grounds for our most valuable lake and stream fishes? What is now being done to care for these grounds properly?

8. How do the different systems of forest management influence the abundance of fish in the included streams? How are the game and fur-bearing animals influenced?
9. How do the different types of storage reservoirs influence the fish productivity of such waters?
10. How do the various water power plants and their dams influence the fish in streams.
11. What is the influence of industrial waste, the sewage of cities, and similar products on the fish productivity of lakes and streams?
12. How can the abundance of suckers, gars, lampreys and ling be reduced in our waters? Our ignorance concerning these fishes is amazing. We can not subdue them and remain so ignorant of their habits. Knowledge is power under such circumstances.
13. Why are not frogs and turtles cultivated extensively in this State?
14. An exhaustive study has never been made of the animals in an American trout stream and who will say it is not worth while?
15. How can we control the epidemics among fish and game animals?

IV. NEED OF TRAINED INVESTIGATORS.

I wonder how many of you feel competent to undertake the solution of all the problems involved in these questions. I for one make no claim to this. This is is not a one-man job, and to undertake such a program upon so small a scale is utterly unworthy of a state. If bureaus of municipal research are needed to solve the problems of our cities, many experiment stations are already at work on agricultural problems, surely forest, fish and game problems should be adequately handled by an able corps of technically trained investigators. Can men without adequate training hope to solve such problems?

We can profitably compare investigators to the spies, scouts and aviators of an invading army who bring in information about the enemy. Of course, an army can get along without them for a time and under some circumstances, but in this modern world, to ignore this assistance in military operations is to invite disaster. The State of New York has for years been conducting its campaign for forest, fish and game animals with little assistance from this kind of scout service. Is this wise?

The complexity of these problems awaiting investigation is well shown by Forbes (Bull. Ill. State Lab. Nat. Hist. vol. 1, p. 20) as follows:

"If one wishes to become acquainted with the black bass, for example, he will learn but little if he limits himself to that species. He must evidently study also the species upon which it depends for its existence, and the various conditions upon which these depend. He must likewise study the species with which it comes in competition and the entire system of conditions affecting their prosperity. Leaving out any of these, he is like one who undertakes to make out the construction of a watch, but overlooks one wheel; and by the time he has studied all these sufficiently, he will find that he has run through the whole complicated mechanism of the aquatic life of the locality, both animal and vegetable, of which his species forms but a single element."

This statement about the bass calls to mind the oft quoted statements from Darwin that the amount of clover seed in a neighborhood may be directly related to the number of cats in the vicinity. Speaking of

the dependence of the clover upon the humblebees in producing numerous seeds, he says (Origin of Species, N. Y. 1876, pp. 57–58): "Hence we may infer as highly probable that, if the whole genus of humblebees became extinct or very rare in England, the heartsease and red clover would become very rare or wholly disappear. The number of humblebees in any district depends in a great measure on the number of field mice which destroy their combs and nests; and Colonel Newman, who has long attended to the habits of humblebees, believes that 'More than two thirds of them are thus destroyed all over England.' Now the number of mice is largely dependent, as everyone knows, on the number of cats; and Colonel Newman says, 'Near villages and small towns I have found the nests of humblebees more numerous than elsewhere, which I attribute to the number of cats that destroy the mice.' Hence it is quite credible that the presence of a feline animal in large numbers in a district might determine, through the intervention first of mice and then of bees, the frequency of certain flowers in that district."

This quotation calls to mind the familiar story of our childhood about the "House that Jack Built." Only a moment's reflection upon the network of relations between the bass and other water animals and the bees, field mice and cats, will convince anyone that the network of relations existing between the fish, game and forest animals is an intimate and complexly balanced one. However, a technically trained investigator will take these complex problems, and perhaps after months and years of work, reduce them to such simple procedure that a two-dollar-a-day man will apply the results every day as a matter of routine; just as we vaccinate for typhoid fever, after the expert bacteriologists have solved the problems involved and reduced it to a simple routine.

CONTRIBUTIONS TO THE LIFE HISTORY OF THE PACIFIC COAST EDIBLE CRAB.

By F. W. Weymouth.

[The British Columbia Fisheries Department has recently issued a report (Rep. of the Comm. of Fisheries for year ending Dec. 31, 1914, Victoria, B. C., pp. 123–129) which is of especial interest and value to California. The report is entitled: "Contributions to the Life History of the Pacific Coast Edible Crab (*Cancer magister*)" and is by F. W. Weymouth of Stanford University. The edible crab has a wide distribution, being found from Unalaska to Magdalena Bay, but it is not commercially important south of Monterey. The description of the fishing methods at San Francisco along with the observations under the headings, "Hoop-nets," "Habits," and "Soft Crabs," are of such interest that they are here given.—N. B. Scofield.]

The hoop-net furnishes the method most widely used in commercial fishing, and the only one possible in "outside" fishing on bars and off sandy beaches where there is surf and strong tides, as at San Francisco, Eureka, and in parts of British Columbia. For these reasons it deserves a more particular consideration. As San Francisco furnishes the largest fishery of the coast, a description of the conditions at this port will serve as an example. Among the crab fishermen power-boats have completely displaced sailboats, though some of the latter are still used by the salmon fishermen. As all the fishing is here done outside

on the bar, where at times heavy weather is encountered, these boats are of necessity seaworthy craft. They are usually twenty-five to thirty feet over all, commonly of the "pinkie" or sharp-sterned type, though some of the Italian boats have the launch or rounded stern.

All the boats are partially decked over and provided with hatches, so that as used only a cockpit remains open, extending about amidships to near the stern. Under cover just in front of the cockpit is located the four- to eight-horsepower gasoline engine, and in some of the newer boats the steering wheel as well. Since the nets are hauled over the right side, this allows one man to control the boat and handle the nets. Such boats range in price from $300 to $500 for secondhand, and $600 to $1,000 for new boats. This with the equipment of nets and other necessary gear brings the cost to from $500 or $600 to $1,200.

* * * [The net] is constructed on two iron rings; the upper, of about one-half inch rod, is two and one-half to three feet in diameter; the lower, of somewhat lighter rod, measures fifteen to eighteen inches. These are connected with rather coarse netting, so that the lower ring hangs about a foot below the upper, giving the whole a shape not unlike a deep dish. The lower ring is stiffened with six spokes, and to the center is lashed a hemispherical cap of woven wire to enclose the bait. The spaces between the spokes are covered with netting, which, like that on the sides, should be coarse enough to permit the escape of undersized crabs. The whole is attached by a bridle of three strands to a coil of stout line (from fifteen to twenty or twenty-five fathoms, according to the depth) which is made fast to a float. The float may be of cork, of hollow wood painted, or of copper. The cork is cheapest, but lasts only one season, and even when new is more easily swept under by strong tides. The hollow wood and the copper floats, though more expensive, last for many years if kept painted, and are more buoyant.

The bait consists of small fish of various kinds taken by seines in the bay. The amount used is not large and the fishermen seldom catch it themselves, being supplied by Italian seiners. The small fish are placed under the wire bait-cover already mentioned, which serves to prevent its being too rapidly eaten by the crabs, which might otherwise clear out the net and leave before it could be hauled.

The fishing is done on a sandy bar outside the Golden Gate in depths of from five to ten fathoms. Here the series of about twenty nets are thrown overboard as the boat runs slowly up against the tide, so that they form a line. The boat then drops back to the first net, which is hauled a half hour or more after being set. Where the tides run strongly it requires no little skill to manage the boat and haul the nets successfully, as the latter must not be stirred on the bottom until they are lifted completely or the crabs will be frightened away. To accomplish this the boat is run up against the tide, the float caught and lifted aboard, and the line carefully coiled in until the boat has reached a point directly above the net, when it is raised with a quick haul and drawn to the surface. The crabs are sorted, those of marketable size being thrown into a compartment in the stern and the remainder overboard. The boats usually go out to the fishing grounds early in the morning and are at work by sunrise. The nets are hauled at intervals of a half hour or more until the early afternoon, when the boats return, and the crabs are transferred to floating live boxes, from which they are later sent to market.

This method, with variations in the completeness of equipment and the substitution of rowboats for launches on more sheltered waters, furnishes most of the markets as well as private tables with crabs.

Habits.

In all the regions examined the crab is found in greatest abundance in shallow water on a sandy bottom, only chance individuals frequenting rocky or muddy bottoms. It ranges from low tide to a depth of fifty fathoms,* though its relative abundance at these different depths varies in different parts of its range. In California it is not taken in shallower water than about two fathoms, and practically all fishing is done at

Fig. 3. The edible crab (*Cancer magister*) The annual catch of crabs in California has a wholesale value of $120,000.

from four to twelve fathoms, deeper water being avoided because of the labor of hauling the nets. On Vancouver Island and farther north, both in British Columbia and in Alaska, the crabs are found not only at these moderate depths, but also in shallower water, where they may be seen and taken with dip-nets or spears at low tide. Certain other species of crab enter shallower water in the northern parts of their ranges; for instance, *Cancer gracilis*, a species which is never fished, is common between tides in Puget Sound, though never found in less than five or ten fathoms in Monterey Bay. In the case of *Cancer magister*, however, this difference in habitat is apparently not the result of natural causes, but of continued fishing, which has depleted the most accessible grounds. This is shown by the history of the fishery. The following quotation pictures the condition about 1880: "The common crabs are caught along the sandy beaches on the San Francisco side of the bay,

Note.—*M. J. Rathbun. Harriman Alaska Expedition, Vol. 10, p. 177.

especially on the south side of the Golden Gate between the city and the sea. They are taken in immense numbers in seines, together with many shoal-water species of fish, yet the supply seems to be undiminished. Three or four good-sized crabs sell in the market at retail for twenty-five cents." Today no crabs could be taken by shore-hauled seines in the locality mentioned, and very few of marketable size by any method in any part of the bay; profitable fishing is confined to the bar three or four miles outside of the Golden Gate. One good-sized crab sells for twenty-five cents in the market on rare occasions, but more commonly for thirty or thirty-five cents. The supply seemed "to be undiminished" only because of the short time under observation. The history of this fishery, which even under protective legislation has markedly diminished in thirty years, is significant for yet unexploited regions.

At Eureka the course of events was similar. In early days in Humboldt Bay a skiff might be filled by spearing the crabs in shallow water with a pitchfork, where now bay fishing even in deep water is unprofitable. While found in shallow water, at least at one time, throughout its range, the edible crab is seldom or never seen between tides as are many smaller forms.

Cancer magister shows a distinct preference for sandy bottoms. Occasionally it is found in the fine sand or mud of bays, but such are always recognizable by their discolored appearance. It is found at times on gravel, but never, as far as I know, on rocky shores. This preference for a sandy bottom is correlated with certain structural peculiarities and a group of habits which may be briefly mentioned here on account of their bearing on the methods of fishing. Observation of the crab where accessible in shallow water and of the young in aquaria furnish the following facts: The crabs may often be seen moving quietly along over the bottom; where buoyed up by the water they move lightly over the ground on the tips of their legs, presenting a striking contrast to their heavy and clumsy movements as ordinarily seen on land. If frightened they dart away with surprising speed. Some of the fish eaten by them must require much agility in their capture, though how this is accomplished is unknown. For the greater part of the time, however, they lie almost entirely buried in the sand, as may be seen from observation in the aquarium or in shallow bays. If examined at such a time, only the stalked eyes, antennules, and antennæ will be visible, and below these a sort of chink between the anterior part of the shell and the flattened maxillipeds which are held slightly separated from the body. From this cleft issues a current, evident if the water is roily, or in the laboratory if India ink, for instance, be added.

When thus buried two conditions must be met: First and most important, a supply of fresh water for respiration must be obtained; and, second, the animal must be informed of the presence of food or enemies. Under ordinary conditions the water is forced through the gill cavity by the rhythmic beating of a specialized appendage lying in an anterior prolongation of the chamber; the water is drawn in near the bases of the legs and escapes near the mouth, forming the exhalent current already noted. When buried, the water must be drawn from the surrounding sand, but it must also be freed from fine sediment which soon coats the plates of the gills and interferes with respiration. If India ink be discharged on the surface of the sand above a buried

crab, it will be drawn into the sand along two lines corresponding to the front borders of the shell, and closer observation will show that it passes into a crevice between the shell and the large pincers which, when folded, accurately fit the contour of the sides of the body, here covered with a dense plush-like coat of hair. The teeth on the overhanging edge of the shell exclude large grains of sand, while the hair acts as a very efficient strainer, removing all fine particles from the inhalent stream. At times the direction of this current is reversed.

These facts explain certain of the habits. Other forms, though closely related, may lack this straining apparatus and thus be unable to burrow in sand; this is the case with *Cancer productus*, which, as a result, is restricted to rocky or gravelly bottoms. In the edible crab this straining apparatus, though efficient in removing the sediment found in the sand, seems less satisfactory in dealing with the finer particles of muddy bottoms, and crabs found in these locations have the gills badly discolored and seldom appear healthy. Other questions, such as food and the adaptation of the legs to sand burrowing, may have some influence, but the preference for sand is largely due to the method of respiration.

The second condition, that of information of possible food or enemies, is equally well met. The exhalent current constantly bathes the antennules, which are thus in a position to sample all the water drawn from the immediate surroundings or coming on the tidal currents from considerable distances. The antennules have been looked on as organs of smell, and though this has been questioned in certain quarters, experimental work which I have recently carried out (unpublished) leaves no doubt of the correctness of this conception. In the edible crab and in the other species tested they are clearly the most sensitive organs for detecting minute amounts of food juices in the water. *Hemigrapsus oregonensis*, a mud-loving species of this coast, will, for instance, go long distances up the small drain sloughs of the marshes to reach meat placed in the running water, but this reaction is prevented by the removal of the antennules, though the even greater injury of cutting off the stalked eyes has little or no effect. A crab buried in the sand will instantly come out in search of food when the current bearing the meat juice reaches it. On the other hand, the eyes appear to be of little use in food getting. Though quick to detect rapid movements, *Hemigrapsus oregonensis*, when moving over the surface of the mud left bare by the receding tide, will ignore food lying in plain view until the legs actually touch it. Moreover, at the depth of ten fathoms the amount of light is probably too small to make recognition of food possible, even if this were the habit in shallower water.

The bearing of the facts just presented on crab fishing is evident. On this coast all the forms of fishing depend on bait. The crab is reported among fishermen to be capricious, "biting" at certain times of tide or day and refusing to "bite" at others. Some fishermen believe that "bright" bait, by which they mean bright, silvery fish, is better, as it is more readily seen. This is undoubtedly an error, as sight plays little or no part in food-getting. On the other hand, the bait should not be dry, but with enough liquids to furnish juices to the surrounding water. The crab is exclusively carnivorous, and examination of stomach contents shows fish to be the most common article of diet,

with shrimps and small crabs next in importance. Fish would, therefore, form the most natural bait; its "freshness," aside from dryness, is quite secondary, as crabs are far from dainty, according to our standards.

At slack water the juices are diffused only a short distance and will attract few crabs; with the beginning of flood or ebb they are scattered far down current and call the crabs even if buried in the sand. The stronger currents of later ebb or flood seem to drive the crabs to cover, though for what reason I can not say; possibly they are swept along unless they bury themselves. It is worthy of note that traps are being operated successfully at Boundary Bay without the use of any bait whatever.

"Soft" Crabs.

Cancer magister is never marketed in the "soft" or recently moulted condition, as is the blue crab (*Callinectes sapidus*) of the Eastern United States. In this respect it is similar to the edible crab of the North Sea. Since the question of "soft" crabs is often misunderstood, it may be well to point out the difference in this regard between the Pacific Coast species and the blue crab. "Soft" crabs are not, as often thought by the fishermen, a different kind or species of crab, but merely individuals which have "cast" or "moulted" their hard outer shells and in which the new shells have not yet hardened. This moulting is general among the crustacea. The hard shell, while it serves many important purposes, absolutely prevents growth. At intervals of about one year, in the case of the adult crab, the shell is cast, and during the few days before the new shell becomes calcified the animal undergoes a surprisingly rapid growth, increasing sometimes as much as a third in breadth, after which its size remains fixed until the next moult.

The blue crab of the Eastern United States is taken immediately after, or more often just before moulting, and kept in enclosures until it moults. It must be used for food as soon after shedding as possible, since the new shell rapidly hardens, and this, together with changes in the flesh incident to the rapid growth, renders it unsuitable for use. It is also used in the "hard" condition, but this is only after the shell has regained its hardness and the flesh has returned to its normal state after the period of growth. It is possible to obtain this crab in the "soft" state, because it is found in the shallow sheltered waters of such bays as the Chesapeake, where it can be taken by dip-nets or by dredges. At this time the crabs are defenseless and inactive, so that only these methods of fishing are effective—they will not come to bait. The edible crab on the Pacific coast, on the other hand, is taken on a commercial scale only by fishing with bait; hence no recently moulted individuals are obtained. When they are finally hard enough to enter pots they are the least valuable for food because of the changes in the flesh already mentioned. In consequence they can only be used when completely hard. Even if they could be obtained immediately after moulting it is doubtful if they could be used, as the blue crab is, for frying, since on account of the greater size of the crab the shell, even when softest, would be leathery and unpalatable.

CALIFORNIA FISH AND GAME

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All material for publication should be sent to **H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California.**

January 15, 1916.

"If bureaus of municipal research are needed to solve the problems of our cities (many experiment stations are already at work on agricultural problems) surely forest, fish and game problems should be adequately handled by an able corps of technically trained investigators."—C. C. Adams.

DO WE WANT SCOTLAND'S GAME LAWS?

The SAN FRANCISCO EXAMINER persists in being antagonistic to the work of the California Fish and Game Commission and continually attempts to delude its readers as regards that most important subject, the nonsale of game. For instance, on November 3 the following note appeared among the editorials under the title "New proof of our game law folly":

"We wish to call the attention of the California Fish and Game Commission to this little note from the London 'Daily Mail':

> Venison was on sale at four pence a pound at the Ladenhall Market yesterday.

"They have been killing deer in England for century on century—and yet they are able to sell deer meat to the people in the public market at four pence the pound. In California, where we have been killing deer in any considerable number only about sixty-five years, the people can not buy venison in the public mart at any price. To sell the venison is a crime. The deer are preserved for the rich sportsmen friends of the Fish and Game Commission."

The following quotation from an editorial appearing in the FRESNO REPUBLICAN clearly shows the untenable position taken by the EXAMINER:

"Once more the EXAMINER returns to its muddle-headed crusade in behalf of the poor who wish to buy pheasants in the St. Francis grill. This time it quotes a note in the London Daily Mail to the effect that 'venison was on sale at four pence a pound in the Ladenhall market yesterday,' and goes on to argue that 'they have been killing deer in England for century on century—and yet they are able to sell deer meat to the people in the public market at four pence the pound. London and Berlin sell pheasants in the open stall where all may buy. But in California the sick poor can not purchase a quail without danger of the constable and the jail.'

"It is, of course, true that they sell venison in London and pheasants in Berlin. But that venison is not wild game. There are no wild deer in England or in Germany, and have not been for centuries. When we raise game in California commercially, then we may safely sell it commercially. The wild game can not compete with commercialism. Venison at four pence a pound is too cheap, anyway. It cost the man who produced it several times that sum. If it is temporarily sold at any such price it is by some dumping process. But we can have game in California as a commercial product whenever we will go into the business of producing it commercially.

"Meantime, one of the interesting spectacles in the State will be the EXAMINER'S continuous argument in favor of the 'democracy' of game. The EXAMINER will continue to argue that the only thing which the poor possess is money, and that the only thing which is the monopoly of the rich is leg power and eyesight. The 'sick poor' who desire quails or pheasants could no doubt all have them if they were for sale for money. But if the only way to get a quail is to go out into the fields and shoot it, obviously the only persons able to walk far enough or shoot straight enough to get the quail are the rich.

"However, the poor have at least this consolation: The chief sport in hunting game is its elusiveness. The EXAMINER'S logic is quite as elusive—and you can

buy the EXAMINER for a nickel or read it free in the public library."

We are very glad to call the attention of our readers to an article appearing in this issue written by Mr. Carl Westerfeld, one of the Fish and Game Commissioners, in which attention is called to game conditions as they now exist in England and Scotland. No one, after reading this article, will desire to attain similar conditions for California. We want the game to be free to everyone, rich and poor, and we will always fight any proposition which delegates hunting privileges to a favored few.

Fig. 4 The bantam eyes with displeasure her charge's fondness for water. Photograph taken at State Game Farm by W. N. Dirks.

FISH AND GAME DEPUTIES GIVEN INSTRUCTION.

In order to improve the warden service trained deputies are being sent out to work with resident wardens. An exchange of ideas is mutually helpful and better co-operation is certain to result. In this way also the new recruits of the patrol service are taught the "tricks of the trade."

DR. CHARLES FREDERICK HOLDER.

In the death of Dr. Holder October 10, 1915, at the age of sixty-four, the friends and guardians of animal life sustained an irreparable loss. He was a rare man. It would be easy to write a long obituary, but not a short one, as I am requested.

His birthplace was Lynn, Massachusetts. Being the son of Dr. John Bassett Holder and Emily A. Gove, he was a direct descendant of Christopher Holder, who established in 1656, the first Quaker society in America.

His early education was in the Friend's School at Providence, Rhode Island. Although not closely connected in later years with "The Meeting," he was at heart ever a Quaker. The latest important work of his life, and a labor of love, was the writing of a book, "The Quakers in England and America," recently given to the booksellers. It is and probably will continue to be the best, well illustrated, condensed history of Quakerism to be found. It is a book for the library of every student of religion and sociology, every broad-minded lover of humanity.

Dr. Holder as a youth had passionate fondness for the water, and for the study of its various forms of life. He thought at first of being a seaman, and at the age of eighteen entered the United States Naval Academy. But he discovered before graduation that his scientific bent should take him in other directions. Two years later, 1871, he became assistant curator of zoology in the American Museum of Natural History in New York

City. In 1879 he married Sarah Elizabeth Ufford of Brooklyn, New York, who survives him. Five or six years later ill health compelled his removal to a different climate, and he came to California. By this move he obtained, as he stated in his last illness, a thirty year lease of life amid delightful surroundings.

And in this thirty year period he became a power, for education, for advancement of science, for social betterment, for advance of every good cause. He had initiative, and set on foot movements that others took up with enthusiasm and carried forward. He was so evidently honest, sincere, high-minded, so courteous, so dignified, so perfectly unselfish, that he won the confidence of all who knew him. The fact alone that he had espoused a cause was enough in the minds of many to claim attention and insure support.

It was largely his personal influence that secured in southern California a preponderating vote for the nonsale law in the last general election.

Dr. Holder was indeed a many-sided man; he wrote upon a variety of subjects, always writing well. He was a lover of play and took recreation religiously. To this he was greatly indebted for the prolongation of his life. His fishing trips, especially, formed the foundation for many charming magazine articles. "The Big Game Fishes of the United States" is one of the most popular books of its kind, and "The Fishes of the Pacific Coast" is the best handbook on Pacific Coast fishes on the market. Although his scientific books were of the popular kind, designed for tourists and sportsmen, they lacked but little in scientific accuracy. The first issue of CALIFORNIA FISH AND GAME contained an article by Dr. Holder on "Attempts to Protect the Sea Fisheries of Southern California."

But sportsmanship, of which he wrote so charmingly, was really a minor part of his serious life. If you doubt this, read the historical book first mentioned, and others. The list of his books, printed on the flyleaf of his latest, comprises thirty-two; and besides these he had made hundreds of contributions to magazines and newspapers.

I will repeat in closing a paragraph from an article written and published the day following his death:

"Dr. Holder was a man of the finest fiber, lover of all that is good, a hater of evil and despiser of shams. He will ever remain in the memory of those who knew him best as a type of the truest gentleman, a loving husband, a faithful friend, a patriotic citizen."—GARRETT NEWKIRK.

ARE WE COMING TO THIS?

A newspaper item in the SATURDAY NEWS of Lewisburgh, Pennsylvania, states that the quail season opens October 15 and closes November 1. The limit is four birds in one day, ten in a week, and twenty in the season. Evidently both season and bag limit are down to a microscopic limit. Will twenty years more hunting in California bring this State to the same short season and small bag limit? The answer is "Yes," unless we profit by the experience of such states as Pennsylvania.

GAME FARM EXHIBIT AT EXPOSITION.

During the Poultry Show and the Children's Pet Show at the Panama-Pacific International Exposition there were on display a number of birds from the State Game Farm. Two cages contained different species of pheasants, while a third which attracted a great deal of attention contained mountain and valley quail and bob-white quail. Perhaps most attractive of all was a small pond on which were exhibited more than ten varieties of waterfowl, among which were mandarin and wood ducks and fulvous tree-ducks as well as all of the commoner species.

DEER RECEIVE ADDED PROTECTION IN CONTRA COSTA COUNTY.

The supervisors of Contra Costa County recently adopted an ordinance prohibiting the killing of deer and antelope within that county. The ordinance reads:

"Every person who pursues, hunts, takes, kills or destroys any deer or any antelope within the county of Contra Costa is guilty of a misdemeanor and upon conviction thereof, shall be punished

by a fine not to exceed five hundred dollars ($500) or by imprisonment in the county jail for a term not to exceed six months or by both such fine and imprisonment."

No limit as to the length of this closed season was set. The increase of deer and antelope will alone decide when the season will again be opened.

PREDACEOUS BIRDS AND MAMMALS.

We hear it constantly said that the best method of increasing our game is to destroy predaceous birds and mammals. The people who make these statements fail to take into consideration that there are many factors which govern the increase or decrease of species and that the effect of predaceous birds and mammals is but slight in comparison with many other factors. Investigate conditions where game is most numerous and one will find that hawks and other vermin are also very abundant. Not only was game extremely abundant in early days in California, but predaceous birds and mammals were also abundant. There seems to be a balance established between the two. More game means more food for the enemies of game, and naturally an increase of them.

The argument is not that it is useless to destroy the enemies of game, but that this method of increasing game species is overemphasized. The hunter too often places the blame for the scarcity of game on hawks, weasels, skunks, etc., when the real blame should go on the hunter himself. So far as we can see predaceous birds and mammals do not greatly decrease any game species under natural conditions. The prime reasons why game is scarce is because too large a toll has been taken by the hunter and food and cover for game has been greatly reduced.

Fig. 5. Transporting cages of ring-necked pheasants for liberation at Lake Chabot, Alameda County. Photograph by W. N. Dirks.

LEADING FISH AND GAME COMMISSIONS OF THE UNITED STATES.

On another page (p. 51) we print an interesting comparison of some of the leading fish and game commissions of the United States. Of course many of the comparisons are rather unfair because of the very different conditions existing in the various states. However, some idea

of the comparative size and the work accomplished by the different commissions is apparent. It will be noted that in a number of respects California is well in the lead.

RING-NECKED PHEASANTS REARED AT GAME FARM PLANTED IN DIFFERENT PARTS OF STATE.

Although no attempt was made to rear large numbers of pheasants at the State Game Farm in 1915, yet a number of birds have been planted in different parts of the State. Over one hundred ring-necked pheasants were liberated near Sacramento and a like number in the river bottoms near Edgewood, Siskiyou County. Very favorable conditions exist in the latter locality and ranchers of the vicinity have promised to give the birds careful protection. Especially good results are therefore expected from this plant. The Santa Clara Valley was restocked in several places and seventy-five birds were sent to Calistoga, Napa County. Fifty pheasants were planted near Lake Chabot, Alameda County (see Figs. 5 and 6). In all 581 ring-necked pheasants were liberated.

As an experiment twelve golden pheasants, ten silver pheasants and forty-four valley quail were liberated on Goat Island, in San Francisco Bay. The pheasants placed on the island several years ago have increased and there is every reason to believe that these new birds will also thrive. The very best protection is afforded them on the island and at seasons when food and water are scarce, these are supplied. About three hundred valley quail reared at the State Game Farm were liberated near the farm in Hayward.

CALIFORNIA FISH AND GAME COMMISSION EXHIBIT IN PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

The California Fish and Game Commission and the California Academy of Sciences co-operated in installing a most striking exhibit of the game resources of California in the Palace of Food Products. Several habitat groups of game mammals furnished by the California Academy of Sciences were conspicuously placed in appropriate surroundings. Some desert mountain sheep on a mountainside, surrounded by cactus and sagebrush, and a family of deer resting in an open forest glade, formed the two most imposing groups (see Fig. 7). In a rocky cave a black bear watching her cubs at play could be seen, and in a similar den a mountain lion guarded her kittens while they fed upon a dead fawn.

A typical hunter's camp among redwoods appeared very realistic with its painted background (see Fig. 8). In the

Fig. 6. Ring-necked pheasants being liberated at Lake Chabot, Alameda County, October 11, 1915. A plant of fifty pheasants was made.

camp were hung some of the different species of game birds, and tree squirrels and mountain bluejays perched in the trees overhead looked very lifelike. A glass case contained the common shore birds, and hanging on the walls of the booth, where attendants were on duty, were examples of practically all of the game birds of the State.

That living things are always more interesting than mounted specimens was demonstrated by the crowds attracted to the aquarium containing trout. Some golden trout from the Whitney region, considered the most brightly colored of all the trout species, were on display for several months. Running water and an abundance of beautiful ferns surrounding the aquaria made this part of the exhibit particularly refreshing.

SQUIRREL POISONING AND VALLEY QUAIL.

The extensive poisoning operations carried on in our national forests by the United States Bureau of Biological Survey have not been instrumental in destroying game birds. For proof of this statement attention is called to the article on page 11. The following quotation from a letter from Dr. A. K. Fisher, in charge of economic investigations, United States Biological Survey, is also of interest:

Fig. 7. Desert mountain sheep group at exhibit of California Fish and Game Commission and California Academy of Sciences, at Panama Pacific International Exposition. Photograph by Cardinell-Vincent Company, Official Photographers.

"In all our poisoning experience in California, our men have found no evidence of the poisoning of valley or mountain quail. Moreover, we never have poisoned any doves, except in one or two instances when wheat accidentally got into the barley, which we universally use for poisoning. In our prairie dog work

we use oats, and so far as I know it never poisoned any game bird. We occasionally kill a few horned larks, jays, and magpies."

WILD DUCK FOODS.

The United States Biological Survey continues to furnish valuable information regarding important wild duck foods. In a recent bulletin of the United States Department of Agriculture (No. 205) by W. L. McAtee, eleven different kinds of duck foods are described. A discussion of each plant and its distribution is given, the value as a duck food is discussed, and a note as to the ease with which it can be propagated is added. This bulletin, along with two others previously published ("Three Important Wild Duck Foods," Bureau of Biological Survey Circular No. 81; and "Five Important Wild Duck Foods," United States Department of Agriculture Bulletin No. 58) will help any one interested in furnishing an increased food supply to our wild fowl.

OUR ANNUAL CATCH OF FUR-BEARING MAMMALS.

The following table is interesting as showing the number of fur-bearing mammals killed in this State during 1914. The table is far from complete, not only because reports are at hand from but few of our national forests, but because the forest deputies reporting were unable to secure definite information. These incomplete returns, however, demonstrate the fact that in our fur-bearing mammals we have a resource which brings many thousands of dollars into the State. If conditions are to improve, or even to remain as they are at present, added protection must be given the fur-bearers. The most needed legislation is a law protecting fur-bearing mammals during the summer season, when their fur is not prime, and one allowing but a short open season on the black bear.

Fig. 8. Hunter's camp, part of exhibit of California Fish and Game Commission and California Academy of Sciences at the Panama-Pacific International Exposition at San Francisco. Cardinell-Vincent Company, Official Photographers.

Fig. 9. Wild valley quail feeding in dooryard. Photograph by J. H. Gyger taken at Elsinore, California, August 1, 1915.

INCOMPLETE RECORD OF FUR-BEARERS KILLED IN NATIONAL FORESTS IN 1914.

	Tahoe	Trinity (4 districts)	Shasta (2 districts)	Sierra (1 district)	Plumas	Klamath
Mountain lion	3	24	1	4	----	----
Black bear	20	44	6	----	----	*25
River otter	----	9	----	----	2	----
Fisher	10	47	----	----	----	----
Marten	----	----	5	----	----	----
Red and cross fox	----	----	----	----	----	----
Fisher	73	105	23	80	10	----
Mink	4	41	----	----	10	----
Weasel	----	----	----	----	----	----
Wildcat	4	114	20	68	28	----
Coyote	----	105	----	----	10	----
Kit fox	----	56	----	----	----	----
Spotted skunk	20	80	----	----	----	----
Striped skunk	50	230	42	----	70	----
Raccoon	100	121	19	25	68	----
Badger	----	10	----	----	----	----

*In November, 1914.

SHORE BIRDS AND THEIR FUTURE.

The Yearbook of the United States Department of Agriculture for 1914 contains a paper by Wells W. Cooke, assistant biologist of the Bureau of Biological Survey, entitled "Our shore birds and their future." A discussion of the history and status of the important shore birds, the Wilson snipe, woodcock, and upland plover, and also of certain others of less importance are given. Particular emphasis is placed upon the great decrease in the numbers of these birds. In the discussion of the Eskimo curlew the blame for its total disappearance is placed upon the hunter.

The following conclusions are reached: "It is evident that shore birds are an important asset in the country's wealth; that their recent decrease in numbers has been due principally to excessive shooting; that state laws have proven inadequate to check this diminution; that the only hope of preserving shore birds lies in federal legislation; but that with a wise federal law, wisely administered, and with an awakened and enlightened public sentiment to aid in its enforcement, there is every reason to believe that the shore birds will again become common enough to enliven the beaches and lake shores with their welcome presence and to afford the hunter a fair amount of legitimate sport."

GAME REFUGES.

According to the United States Department of Agriculture (Farmers' Bulletin No. 692) two national bird reservations have been created by executive order—one on a small island in Mille Lacks Lake, Minnesota, and one on Big Lake, in Mississippi County, Arkansas—and at least fourteen states enacted legislation affecting refuges for game. California established three large refuges in national forests; Idaho two refuges, one of which was stocked with fifty elk from Yellowstone National Park; Montana enlarged one of its refuges and decreased the area of another. Oregon abolished three

refuges, created two years ago, and Wyoming established one refuge and changed the boundaries of two others.

Illinois, Pennsylvania, and West Virginia authorized their fish and game commissions to enter into contracts for the establishment of game refuges on private lands. California already has such a law, West Virginia, lest too much land be set aside for the purpose, limited the area in any one county to ten thousand acres.

It can be seen from the above that interest is now centered in the game refuge as a factor in game conservation. Judging from the reports coming from states in which game refuges have been established for a number of years, sentiment in favor of conserving game by means of the sanctuary is growing and the next few years will doubtless see many thousands of acres added to the already extensive refuges.

Fig. 10. Members of National Association of Fish and Game Commissioners visiting State Game Farm at Hayward, California, September 9, 1915. Photograph by G. H. Graham.

CALIFORNIA AND SPIKED BUCKS.

A bulletin of the United States Department of Agriculture intimates that California is the first state to protect spiked bucks," or deer with unbranched horns, instead of deer with horns of a certain length. As has been proven by the past open season, this law can be easily enforced. Except in this instance, California has shown little originality in its game laws. Instead of profiting by the experience of Eastern states she has followed along in their footsteps and now faces conditions which might have been averted had more originality been shown in the formulation of game laws.

VIOLATORS OF THE GAME LAWS.

In November, violators of the game laws in the vicinity of Los Banos, Merced County, fired upon deputies of the Fish and Game Commission. The deputies secured Winchesters and thereafter were not molested. This locality seems to be a hotbed for violators of the type that "keep an extra cartridge in the gun for the game warden," for it will be remembered that in the same locality last year a game warden was killed when he attempted to search a wagon loaded down with ducks.

A DISTRIBUTIONAL LIST OF THE BIRDS OF CALIFORNIA.

There has just come from the press what is without doubt the most valuable reference work on California birds published up to the present time. The title, "A Distributional List of the Birds of California," gives but an incomplete idea of the contents of the work. Introductory

chapters deal with theories and principles concerning the distribution of animal life with especial reference to conditions in California. Then follows an up-to-date summary of the manner of occurrence of the 541 species and sub-species of birds now authentically credited to the State. A supplementary "Hypothetical List" pertains to such species as have been accredited to California on insufficient grounds, with the author's reasons for doubting the authenticity of the records.

Each species is accorded the following treatment: First, the accepted name, English and scientific, followed by a complete synonymy of all the names under which the species has been known *in literature pertaining to California*. Then a statement, as concise as possible, of the exact range in California, and, in general, its status as resident, or migrant, etc., as the case may be. Authorities are given for practically every statement that the reader might wish to verify, consisting mainly of references to literature, or to specimens existing in collections.

The index is an extremely valuable feature of the publication, including as it does, besides the currently accepted names of the species, all the synonyms under which they have been known in California ornithological literature, so that the general reader will be able to ascertain at once the exact status of any bird he may happen to read about, no matter under what name it be listed.

Fig. 11. Fish and Game Commissioners Avery of Minnesota and Crampton of Connecticut with pet valley quail at State Game Farm, Hayward, California. Photograph by G. H. Graham.

Careful research and the gathering of series of museum specimens have led to a great advance in knowledge of California birds during the past few years. The pioneer ornithologist, Dr J. G. Cooper, was able to catalog but 353 different varieties in 1858. By 1892, 445 different species were known, 491 in 1902, and 539 in 1912; whereas this last list enumerates 541. Of the number now

known to exist within our State, 168 are water birds, 373 land birds, and 108 game birds. Members of the sparrow family are most numerous, 96 different varieties being known in California. A large number of the additions to the State list are what are known as stragglers—birds which only occasionally wander into California. Notable among some of the out-of-the-ordinary birds whose occurrence has been noted in California, are the Wilson stormy petrel (Mother Carey's chicken), the water turkey, eastern sea brant, roseate spoonbill, Tennessee warbler, and Louisiana water thrush.

The author of this distributional list is Dr. Joseph Grinnell, director of the University of California Museum of Vertebrate Zoology, one of the foremost ornithologists of the Pacific coast. He is also editor of the "Condor," the official organ of the Cooper Ornithological Club, and one of the foremost of the ornithological periodicals of the country. The "Distributional List of the Birds of California" is number eleven of the series of Cooper Club publications known as the "Pacific Coast Avifauna." It can be procured only from Mr. Lee Chambers, business manager of the Cooper Ornithological Club, Eagle Rock, California, at three dollars per copy, unbound. Members of the Cooper Club are enabled to obtain the book at half price.

LECTURES ON WILD LIFE.

The Bureau of Education, Publicity and Research is in a position to furnish gratis to a limited extent, stereopticon lectures on the following subjects to organizations that make application:

1. The Game Birds of California.
2. The Game Mammals of California.
3. "Our Vanishing Wild Life."
4. A Scientific Basis for Bird Protection.
5. Methods of Game Conservation.
6. The Economic Value of Birds.

HATCHERY AND FISHERY NOTES.

CRAB FISHERIES AND THE CRAB LAW.

The crab season opened in this State on November 15 and will remain open until July 30. The rest of the year is closed in order to protect the crabs during the breeding and moulting times. Besides this closed season crabs are given additional protection by prohibiting the sale or possession of female crabs and the possession or sale of male crabs measuring less than seven inches across the back.

California has become a crab-eating state, and crabs find here a better market than in any other Western state. There are taken annually in the waters of California 60,000 dozen crabs, and we import from the North 15,000 dozen more. These crabs are brought to the wholesale markets in sacks, two dozen to the sack, and in two grades, large and medium. Large crabs average twenty-four pounds per dozen, medium crabs twenty pounds per dozen. The fishermen get from $1.25 to $2.25 per dozen and the consumer pays from twenty-five cents to thirty-five cents apiece. Over two hundred crab boats operate out of San Francisco and Sausalito and about thirty-five in Monterey Bay, while minor fisheries are located at Fort Bragg, Eureka, and Crescent City. The value of boats and nets engaged in the fishery in this State is near $200,000, and the crabs caught have a wholesale value of $120,000.

Until within the last three years crabs have not been taken in Monterey Bay in sufficient quantities to be commercially important. In 1913 a few crabs were shipped from Monterey and Santa Cruz and before the salmon run took the time of the fishermen, twenty-five boats were operating and catches of as high as twenty dozen to the boat were made. The crabs were taken principally with three mesh or trammel nets set on the bottom off the sand beaches. Fishermen say that attempts to catch the crabs with the hoop-nets as used at San Francisco have not been successful. The law prohibited the use of trammel nets in the years 1911 and 1912, but during the years prior to that time when trammel nets were used the take of crabs was unimportant. On resuming the use of trammel nets in 1913 crabs were taken in paying quantities and during 1914 the catch was so good

that the opening of the season in the present year found thirty-five boats operating. Trammel nets were again forbidden in Monterey Bay by the last State Legislature, for it was found that fully 20 per cent of the fish caught in these nets, set on the bottom, were destroyed by hag fish, or "eels," as the fishermen call them, before they could be removed from the nets. Large numbers of undersized and female crabs were often caught in the pockets of the nets, and the easiest way to remove them was to kill what would not shake out. Otherwise the crabs would hang on with their pincers and it would take hours of time and much patience to remove them.

With these nets forbidden under the present law, single meshed gill nets have been employed with more or less success. Fish and Game Deputy P. H. Oyer reports that during the latter part of November the boats from Monterey each took an average of six dozen crabs a day with these nets and that the crabs are exceptionally large, measuring over seven and one-half inches across the back. The fishermen report that they see no female crabs. They think that the single meshed net catches crabs as well as the trammel and the undersized crabs are easily released. In fact, with the seven and one-half inch meshed nets which they are using they say they catch no female crabs and very few crabs that are undersized.

Fish and Game Deputy R. B. Hencock reports that the Santa Cruz crab fishermen are not having the success they anticipated. The twelve boats fishing on that side of the bay take from thirty to forty dozen crabs a day. They started fishing in fourteen to sixteen fathoms of water but have found the crabs more plentiful in deeper water, several of the boats fishing in thirty-five fathoms. They think the single mesh net is not as effective as the trammel, but, on the other hand, if a mesh no smaller than seven and one-half inches is used most of the females and undersized males escape and those that are caught can be more easily removed without injury. The paranzella trawl nets fishing in forty-five to fifty-five fathoms of water west of Santa Cruz each take about two dozen crabs a day, while fishing for "soles" and "sand-dabs."

In June, 1914, it was reported that large numbers of dead crabs were being washed on the shore at Monterey and their destruction was laid to the trammel nets. On visiting Monterey on June 22, many of these "dead crabs" were still in evidence and were found to be the cast shells of crabs averaging six inches across the back. Fishermen of experience had taken these for dead crabs. The crab season opens on November 15, at which time the crabs have shed their old shells and the new ones have become hard and the flesh has lost its watery consistency and is again good to eat. From the following observations it appears that the moulting season may be later in northern California.

Fish and Game Deputy E. C. Boucher saw on September 30, 1915, at Crescent City, Del Norte County, more than a hundred cast shells of the edible crab which had just been washed on the beach. Most of them were very large, measuring near nine inches across the shell. A few days later he noticed fresh cast shells on the beach at the mouth of Smith River. Deputy H. S. Prescott reports that on November 20 at Crescent City, he saw a crab which had just moulted and was still in a watery condition, and adds: "The fishermen here think the season opens two weeks too early as this shedding condition is general at this time of the year."

SUMMER MIGRATION OF EDIBLE CRABS.

During the summer months there is a considerable movement of small, edible crabs into the lower ends of the rivers and creeks flowing into San Francisco Bay. These crabs, which are immature, average about four inches across the back. Their migration, which undoubtedly is the result of a search for food, is probably regulated by the advance of salt water into the lower streams caused by the lessened flow of water during the dry summer months. The crabs are strictly salt water animals and die if placed in fresh water. As the salt water moves up into the stream on a flood tide they advance and occasionally are caught by the fresh water during the ebb and to escape this they crawl out on to the mud or into the tules and it is reported they occasionally die here by the thousands. They are numerous during the summer in the Carquinez Straits and have been found as far up as Pittsburg, on the San Joaquin River.

SOFT-SHELLED CLAMS PLANTED IN MORRO BAY.

Dr. Harold Heath of Stanford University has just completed a preliminary survey of the clam and shell-fish beds of California, and the Fish and Game Commission expects to publish his report in the near future.

Under the supervision of Dr. Heath, two thousand Eastern soft-shell or mud clams (*Mya arenaria*) were on the fourth and fifth of November, 1915, set out along five different beaches in Morro Bay, San Luis Obispo County. These clams, which were introduced into several of our bays some fifty years ago, have never before been "planted" in Morro Bay. Dr. Heath reports the conditions most favorable and states that a "set" of young clams may confidently be expected in the latter part of next August.

REPORTS ON THE SALE OF FISH.

Monthly reports of the fish handled in the State are being regularly submitted to the Fish and Game Commission. They are sent in by handlers of fish in compliance with a law recently passed, and we hope with the next issue of this magazine to commence making quarterly reports of the quantity of each variety of fish, mollusk and crustacean taken in the State.

NEW FISH CANNERY ON SAN DIEGO BAY.

The Neptune Sea Food Company of San Diego, of which Mr. F. W. Johnson is president, has just completed and started to operate a new fish cannery on San Diego Bay. Its principal business will be the canning of California sardines. It is the intention of this company to put out a very fine article in oil in quarter-pound flat cans. It will also can the larger sardines soused in one-pound oval cans. The plant is also equipped to dry and pickle fish by means of the latest sanitary methods.

Fig. 12. Eel River Hatchery where salmon were spawned in the fall of 1915 to obtain eggs for hatching. The run of salmon on the Eel River was up to the average in the fall of 1915.

CAVIAR FROM SALMON AND SHAD EGGS.

Mr. A. Cotoff, a Russian expert in the manufacture of caviar and other fishery products, has recently arrived in San Francisco, and in company with Mr. B. Nosov, is trying to interest local fish dealers in manufacturing caviar from salmon and shad roe, which at the present time is being thrown away in enormous quantities. Mr. Cotoff was astonished to find that here fish roe and milt are little used, especially as there is an excellent local market for the roe in the form of caviar. Imported caviar is sold at from $2.50 to $2.75 a pound, and he says he can manufacture a superior article here at

a cost of thirty cents per pound. If some good use can be made of the roe and milt as food, what is now a waste product will be utilized, for half a million pounds of salmon roe alone are thrown away each year in the State.

FISHERIES OF LOWER CALIFORNIA UNPROTECTED.

It is reported that representatives from the Pacific Coast will ask our government to seek the purchase of Lower California from Mexico. Lower California, besides the harbor of Magdalena Bay, possesses valuable fishery resources. Many of the sea fishes taken in California waters spend their spawning season off Lower California. In fact, that is their principal residence and they follow their food into California waters during the summer time. To properly conserve these fish, the most important of which is the long-finned tuna, it will be necessary to protect the young and the spawning fish in Lower California waters. The value of the long-finned tuna pack in California exceeds $1,500,000 a year and the stability of this great industry will depend on the protection the fish get in Lower California. This protection could best be given if the United States government had control, for Mexico has not protected her west coast fisheries in the past and is not likely to do so for some time in the future.

THE HUMPBACK AND DOG SALMON TAKEN IN SAN LORENZO RIVER.

During November of this year Deputy H. B. Hemrock took several humpback salmon (*Oncorhynchus gorbuscha*) and three dog salmon (*O. keta*) in the San Lorenzo River, Santa Cruz County. This is not the first time the humpback has been recorded from this stream. It appears here only occasionally, however, and is far out of its natural range. Stray individuals have been taken in the Sacramento also, but as far as is known the San Lorenzo is the most southerly point from which it has been recorded. The humpback salmon reaches a weight of from three to six pounds and matures at two years. The spawning males are thin and compressed and have a decided hump just back of the head. The color of the fish is bluish above with numerous round black spots, which on the tail are large and oblong in form. The scales are smaller than in any other salmon, there being over two hundred transverse rows along the side of the body.

The dog salmon has been reported from the Sacramento River also, but never before from a point as far south as the San Lorenzo River. As a result four out of the five species of salmon have been taken in the latter stream: the quinnat, silver, humpback and dog. The remaining species, the blue-back or sockeye, does not appear in California except as stray individuals are occasionally taken in our northern streams. Mr. G. R. Field reports that about twenty sockeye salmon were taken in the nets on the Klamath River this summer. He also records the capture of a striped bass just outside of the mouth of Klamath River about August 1, 1914. The fish was six or seven pounds in weight.—N. B. Scofield.

THE FALL RUN OF SALMON.

The fall run of salmon on the Sacramento River has been a very light one this year. The take of salmon eggs at the spawn-taking stations, which may be taken as an index of the size of the run, was no more than half the usual amount.

The runs on Eel, Klamath, and Smith rivers, however, have been good and up to the average. On Eel River two species of salmon are taken, the quinnat (known in the North as king and chinook) and the silver salmon. The netting season now opens on this stream on October 7, a much better arrangement, for the fish caught on the opening day were in excellent condition this year, which was far from the case in previous years, when the season opened later. The netting season now closes on December 7, which may be a little late to give the best protection to the two species of salmon and to the steelhead, which begins running in increased numbers late in November, but it is far better than the old law which allowed netting until the end of January. Large numbers of the two species of salmon on Eel River are shipped fresh to San Francisco. A few are salted and mild cured. Salmon have not been canned on this stream for several years.

On Klamath River two species, the quinnat and silver, are taken, and practically all are canned, very few being shipped fresh.

On Smith River also both quinnat and silver salmon are found. Here the fish are canned, none being salted or shipped fresh.

Quinnat salmon are caught in commercial quantities in Monterey Bay in June, July and August. They are caught entirely by trolling (see Fig. 13). The catch this past summer exceeded two and a half million pounds, slightly exceeding the catch of last year, which was the largest catch ever made in the bay up to that time.

DO HOOKED FISH DIE AFTER BEING RETURNED TO STREAM?

There has been considerable discussion as to whether undersized trout taken with baited hook live after being returned to the stream. On the supposition that a large percentage of them die, the law was changed a few years ago so that there is now no size limit. In order to test out exactly what the death rate on the hooked fish really is, one hundred undersized steelhead trout were carefully taken from the hook and placed in a box alongside of the Noyo River, Mendocino County, through which a good running stream passed. In reality the fish were simply held in a portion of the river by means of screens. Of the one hundred fish experimented upon, sixty-six died within ten hours after being hooked. Judging from this experiment, therefore, about 60 per cent of the undersized fish taken with baited hook, returned to the stream by the angler, die.—W. T. Clarke.

FLY-CAUGHT FISH NOT INJURED.

The statement has been so often made that it is useless to return a hooked fish to the water because it will die anyway, that most anglers have come to accept it as an axiom; yet the idea is erroneous. When the anglers of California shall have learned that it is not necessary to take the life of a young fish merely because it becomes impaled upon a fly-hook, thousands of immature fish will annually be returned to the water to grow up sizeable fish ere they find their way into the baskets of the angling fraternity. For, anglers as a class are not wantonly destructive; and it is wanton destruction to knowingly take twenty fish from a stream in order to secure as much fish in pounds weight as one fish out of the twenty would amount to if permitted to remain in the stream for another season or two.

Fig. 13. Salmon boat on Monterey Bay with outriggers for trolling. Photograph by N. B. Scofield.

The best answer to the statement that hooked fish will die when returned to the water is to point to the fact that most of the waters of a vast section of the Sierra Nevada Mountains have been stocked with fish which were taken with hook and line. In all the hundreds of plants which we have made in the barren waters of the San Joaquin, Kings,

Kaweah and Kern River watersheds with fish taken from their native habitat by means of a fly, there is no record of a failure to successfully establish the fish in the new waters. Nor can doubt be cast on this kind of evidence by suggesting that for all our success, the percentage of fish which actually survive being hooked, might have been very small; for the reason that all the evidence points to the conclusion that the percentage of losses among hooked fish must have been a negligible quantity. For instance, I recall one stream, Kaiser Creek, in the San Joaquin watershed, which was stocked with only three fish taken from the main San Joaquin River. A plant of three fish does not allow for a considerable percentage of loss if the stream is to become stocked. In many other instances where we have planted but a few fish in comparatively insignificant streams, such streams were always found a few years later to be well stocked with fish.

Again, in the office of the Fresno division of the Fish and Game Commission, we have the record of many long carries of adult fish, which were taken with hook and line, to be transplanted in far distant barren waters. Repeatedly we have taken and held such fish in the cans for periods of from seven to fourteen days. Overlooking the hazard which always accompanies holding large numbers of fish in a can and taking no account of the trying experience of being carried in such cans on the backs of pack mules over the roughest of the Sierra Nevada Mountains for many succeeding days, the percentage of losses from all causes among such fish is very small indeed. There is no more delicate fish to successfully carry than the golden trout, yet in his official report, now before me, I find that Deputy S. L. N. Ellis, of the Fresno division, in September, 1913, carried 821 golden trout from Whitney Meadows to the Roaring River watershed. The actual carry was six days successive travel and the total time which the first of the hooked fish had been in the cans until they were finally liberated, was fourteen days. The fish, according to Deputy Ellis's report, were planted in good condition with a loss of only five fish.

In 1914 the Fish and Game Commission, through deputies of this Fresno division, took with hook and line, from Volcano Creek at Whitney Meadows, over 5,000 golden trout, which were used in stocking barren waters along the Sierra summit, and most of these fish were carried on pack mules for periods of from four to fourteen days. Commissioner Mr. Carl Westerfeld was present during many of these operations and will, I am sure, bear witness to the fact that the losses among such hooked fish were practically nil. Out of one lot of 1,080 golden trout, all taken with hook and line, and held in cans from seven to ten days, of which most of the time they were en route via pack train to their destination in new waters, there was a total loss, from all sources, of just three fish. These are but typical instances. In eighteen years of experience while planting hundreds of barren waters with thousands of fish taken with hook and line, I have found that with reasonable precaution, at least 95 per cent of all trout taken with a fly are not fatally injured.

Conceding that much of the success in preserving the lives of these hooked fish was due to skillful handling, the proof is, nevertheless, that it is not necessarily fatal to a fish to become impaled upon a barbed hook. I am quite willing to concede that a hooked fish can be fatally injured by rough or careless handling; and I know that if a trout is hooked deeply in the throat or gullet it will probably die, but to avoid killing the greater percentage of hooked fish is an easy matter; nor does it require an unusual amount of skill, time or patience. In taking up fish for transplanting we naturally try to take as many fish as possible in a short time; hence we can not devote much special care to saving each fish. The man who fishes for pleasure can easily duplicate our methods in avoiding injury to the fish.

In the first place, of course, we take our fish for transplanting entirely with "flies." By using a No. 8 or even a No. 10 hook, the small fish do not readily swallow the hook and thus when impaled, they are hooked in the cartilage about the mouth. Taking hold of the fish with a wet hand in order to avoid breaking

down the scales, we gently disengage the hook and the fish is then as free from injury as though it had never taken the lure. While it is undoubtedly the chief thrill of the angler to take a large fish on a small fly, at the same time Midget flies will hook more small fish deeply than larger flies. Some day anglers may make it a rule to use small flies when fishing in waters where big fish predominate, and No. 8 flies in streams where the fingerlings greatly outnumber the sizable fish. Again, the destruction of immature fish by the use of very small bait hooks must be great. Even this difficulty could probably be avoided (if people *must* fish with bait hooks) by using larger hooks. The point is that, unless hooked deeply in the throat or gullet, practically no fish need be killed by reason of having been taken with hook and line, provided reasonable care is used in taking the fish from the hook and in returning it to the water. If a trout is deeply hooked to the extent that much blood is drawn when taking it from the hook, such fish may just as well be put in the basket and become one of the day's catch; but all the while it should be borne in mind that with reasonable care the percentage of such small fish which must necessarily be creeled, is comparatively infinitesimal.—A. D. FERGUSON.

CONSERVATION IN OTHER STATES.

BULL FROGS INTRODUCED INTO OREGON.

In the last number of THE OREGON SPORTSMAN a writer states that the edible bull frog, originally imported from France and established near Boise, Idaho, has been introduced into Oregon. Thirty dozen tadpoles and about six dozen adult frogs secured in Idaho, have been placed in the ponds and sloughs of Baker and Grant counties. It is said that frog hunting is considered great sport in parts of Idaho. The frogs are taken by using a .22 calibre rifle or by lowering over their heads a hook baited with red flannel. As great caution must be used in approaching the big ones as is used in angling for an old and wary trout. The introduction of the edible frog has been made in order that recreation and food may be had in localities where game does not abound.

A CONNECTICUT POSTER.

Connecticut is attempting to educate her citizens regarding wild life by displaying throughout the state placards bearing the following information:

The very startling statements made by the Hon. Wm. C. Redfield, Secretary of Commerce, in his address before the National Fish and Game Commission held in Washington in September last, prompts the Commission to make this vigorous appeal to you. Secretary Redfield stated that insects cause an annual loss of two and one-half billion dollars to the agricultural interests of the United States.

Forty years ago, the preservation of wild life was regarded chiefly as a sentimental cause, of practical interest to the sportsman only. Today, that cause is not only acutely sentimental, but it has also been intensely practical to millions of American producers and consumers. It affects the lumber pile and the market basket, and it is of such practical importance that it demands the attention of the public at large.

COUNTIES MAY CLOSE SEASONS ON GAME IN PENNSYLVANIA.

Local protection is given game in Pennsylvania by a law which gives the board of fish and game commissioners of the commonwealth power to close, for a term of years, all hunting of elk, deer, squirrels, wild turkey, ruffed grouse, quail, ring-necked pheasants and Hungarian partridge, or either of them, as it may appear necessary to the citizens of any county. Whenever at least two hundred citizens of a county, through written petition, certify to the board of game commissioners that, in their opinion, an absolutely closed season is necessary to insure the better protection and subsequent increase of such game and shall have furnished the commissioners with proper information relative to the status of game and shall have published for at

least three consecutive weeks in two or more prominent newspapers a statement that such a petition has been filed, the commissioners are empowered and directed to declare a closed season not to exceed five years. Although this law is not yet a year old, many counties in Pennsylvania have taken advantage of it to close the season on deer and elk and in some cases on ruffed grouse and quail.

SHARP-TAILED GROUSE IN OREGON.

In that the sharp-tailed grouse was formerly numerous in northeastern California but is now extinct, the following good news from Oregon is particularly interesting. Had California taken better care of her game resources this species would still be a member of her fauna.

Mr E. F. Averill, of Pendleton, Oregon, reports that in 1912 there was a small band of Columbian sharp-tailed grouse or prairie chickens on the farm belonging to J. M. Tabor, Hermiston, Oregon. These birds have been carefully protected by Mr. Tabor, and last winter Mr Averill counted over 150 birds in the flock. He thinks it has increased to at least 200. This bird has been very rapidly disappearing in Oregon, and this seems to be one of the few places where they are not only holding their own, but increasing.—*The Oregon Sportsman*, October, 1915.

PROTECTION REMOVED FROM BUZZARDS AND CORMORANTS.

Legislation relating to game in 1915 showed a tendency to remove protection from the turkey buzzard and cormorants. The former is accused of carrying diseases of cattle and hogs, and the latter are doomed to destruction because of their avaricious appetites for fish. Delaware, Florida, and North Carolina removed protection from the turkey buzzard and Illinois and North Dakota from cormorants.

STATE LAWS HARMONIZED WITH FEDERAL REGULATIONS.

A recent government report states that a number of bills have been introduced in various state legislatures for the purpose of harmonizing the state laws on migratory birds with the federal regulations. In at least nine states changes have been made which bring the seasons into substantial agreement, viz: California, Connecticut, Maine, Michigan, New Hampshire, Tennessee, and West Virginia; in Illinois the seasons for all migratory birds except coot and waterfowl, and in Washington for the smaller shore birds. Uniformity was also secured by provisions in the laws of Connecticut, Maine, New Mexico, North Dakota, Washington, and Wisconsin, prohibiting hunting between sunset and sunrise. On the other hand, Delaware adopted a resolution opposing the migratory bird law, and Ohio and Rhode Island, which had harmonized their seasons in 1914, changed the laws on waterfowl this year.

THE "OREGON SPORTSMAN" IN NEW FORM.

With the October issue THE OREGON SPORTSMAN changed from a monthly to a quarterly publication. In its new form it contains more than three times as much reading matter. As in the past, it will treat of all the phases of game protection and propagation and will emphasize the importance of making fishing and hunting a valuable resource of the state. Under the editorship of three men, C. D. Shoemaker, state game warden, W. L. Finley, state biologist, and G. P. Putnam, secretary of the Oregon Fish and Game Commission, it becomes more distinctly a state publication. The subscription price, fifty cents a year, remains the same.

BISON HERD INCREASED.

Recent reports state that ten calves have been added to the government's herd of buffalo on the Wichita National Forest in Oklahoma, which is also a federal game preserve. Eight of the calves are females, and bring the number of heifers and cows up to thirty. The bulls number thirty-two and have been placed in a separate pasture. The herd now comprises sixty-two specimens in all, and is in good condition.

LIFE HISTORY NOTES.

GREEN-WINGED TEAL NESTING IN ALAMEDA COUNTY.

It has been conceded generally that the green-winged teal (*Nettion carolinense*) does not nest commonly in the State of California. Definite records of nesting are limited to Ventura County, Tulare Lake, and Sierra Valley, Plumas County. It was of interest, therefore, to find this teal breeding in numbers in the marshes near Alvarado, Alameda County. On June 22, 1915, a female green-winged teal and four young almost as big as herself were seen here on a pond, and one of the young was captured. On June 26, in marshes north of Alvarado, five green-winged teal, part of them young birds, were seen. On the 29th of the same month a young green-winged teal about two weeks old was captured, and the following day three downy young, but three or four days old, were obtained. The mother accompanied these ducklings and was approached within a distance of fifteen feet, so that identification was sure. Again, on July 9, I came upon a female green-wing with twelve young about her, apparently about a month old. One of these birds was secured also. The last young green-wings were seen on July 14, when five adults were flushed and three young birds were captured.

Of the young green-winged teal captured, a number have grown to maturity and are now in full plumage, so that there is no doubt but that identification was correct. These birds may be seen on the pond at the State Game Farm at Hayward. Several sets of eggs taken in the same locality in May were hatched out, and the downy young appeared to be green-winged rather than cinnamon teal. Hence, it seems that the green-winged teal, as well as the cinnamon teal, is a common breeder in the Alameda County marshes.—W. N. Dirks.

THE OPOSSUM IN LOS ANGELES COUNTY.

In February, 1915, an adult female opossum (*Didelphis virginiana*) was brought to me at Whittier, Los Angeles County, having been caught in a trap in the flats about the San Gabriel River, a mile and a half from town. She was found to have ten young in her pouch. From their size and immaturity, I should judge they were less than a week old.

The finding of this animal led to reports of many others having been caught in the vicinity. As usual, many of these reports, when traced to their source, proved to be only hearsay, with nothing definite back of them. Several, however, proved more reliable. Of these, the first record was in 1906 by a road overseer, who ran over an opossum within about a mile from where the one brought to me was found. He said two others were taken the next day near the same place. According to his report there "seemed to be lots of them in the river bottoms, just like the ones we used to get back in Missouri and Arkansas; only these were not so big. They seemed to be a smaller kind."

The next record was in February, 1912. An old opossum was taken in a chicken yard some little distance from the river. Another has since been reported from the same place, taken in October, 1915.

In June, 1913, an old female opossum with several young, unborn, was taken near the place of the first record. This one was mounted and is in the possession of a taxidermist of this vicinity.

While the above are the only authentic records, still there seems to be a general impression that opossums have been taken occasionally for the last five years, although several Mexicans and ranchers living near the river were entirely ignorant of the presence of these animals in the locality.

The one brought to me was kept for several months in a cage. She was fed a variety of substances, but seemed to prefer fresh liver to any other food. Although it is said opossums will eat carrion, this one would not touch it. Occasionally she would eat vegetables, such as lettuce and tomatoes. She preferred fruit to vegetables, but would leave even this untouched if fresh meat were given her.

During all the time of her captivity, from February till September, neither she nor the little ones showed any signs of domestication. The young ones continued to snap and even jump at any one putting his hand in the cage; the old one, according to my observation, did not at

any time snap at any one, although she would open her mouth at the slightest disturbance. The young developed this trait of opening the mouth as soon as they left the pouch, and exercised it upon every occasion possible.

When the mother was brought in, one of the young was taken from the pouch with great difficulty. It was clinging to the mammary gland so tightly that enough force to all but pull the little one in two was needed before it could be dislodged. The young all appeared to have clinched their jaws so that they could not loosen, for it was several weeks before any of them were observed to be free from their mother. They then began to crawl about within the pouch and eventually to venture outside it. The one taken from the pouch, and preserved, is very undeveloped. Although there was a small hole for the ear, there was no opening connecting with the interior, and the eyes were still closed. Apparently no distinct lids had been formed. It was over a week before such openings could be detected. The legs also were very small and undeveloped compared to the rest of the body, as is seen in all embryos.

Although a large cage was made for the opossums and a small tree was put inside it, they were never seen to climb and their legs became bent and gnarled from lack of use. This might have been partly due to the fact that the mother was crippled and did not move about freely.

The hot weather in August apparently was too much for them. First the mother died and then one by one the little ones.—LYDIA V. LITTLE.

CANADA GEESE SUCCESSFULLY BRED IN CALIFORNIA.

The statement that Canada geese (*Branta canadensis canadensis*) had not been bred successfully in California, which appeared in a recent number of CALIFORNIA FISH AND GAME, has elicited the following communication from Mr. George Neale of Sacramento:

Mr. Henry Schook of Yreka, Siskiyou County, California, for many years raised a large number of Canada geese. Some years ago I saw a number of young and old birds of this species at his place and Mr. Schook also showed me the nesting places in some old barrels in his yard. On the other hand, Mr. A. W. Stuart of Grand Island, Sacramento County, has kept eighty wild geese of all the varieties common to California for many years. These geese, however, have never laid an egg. It seems, therefore, that in all probability Canada geese can be successfully reared only at elevations of over 2,000 or 2,500 feet.

A letter from Mr. Schook of Yreka states: "I tipped the wings of two honker geese, and then took them home and doctored them up. It just happened that they were a pair. In the spring the female began laying and reared six young. The next season the old birds raised twelve more and a pair of those raised the previous year raised five. At one time I had thirty-eight birds. Children and strange dogs have killed them all so that I have none at the present time. A friend of mine to whom I gave one that I had raised, still has it. It must be very nearly twelve years old."—H. C. BRYANT.

VALLEY QUAIL SUCCESSFULLY PROPAGATED.

About June 15, 1915, I discovered that the one pair of valley quail I had in captivity was nesting. The nest on that date contained eight eggs. The number soon grew so that I could not count them without disturbing the birds. I did not go near them till I thought it about time for the female to be sitting, but she showed no signs of doing so. About the first week of July, fearing she would not sit, I took twelve of the eggs and gave them to a bantam hen; she sat and hatched nine and raised seven of them. Shortly afterwards I took the remainder of the eggs, fourteen in number, and gave them to another bantam; she hatched eight but trampled four of them, and one got away, so only three remained.

Later I discovered the quail was still laying. Twenty eggs were, therefore, taken and given to a third bantam, but only two of the twenty were fertile. These hatched and were successfully reared. Later I found four more eggs, making fifty eggs for the season.

A few days before the quail were due to hatch I put some meat scraps aside to raise maggots, which I fed to the quail

after they were twenty-four hours old. I also fed them chick feed and chopped cabbage. They thrived on this feed and I do not think I lost one from sickness.

As they hatched I put them in a box about three by four feet with sand and dust in the bottom and wire over it, and at about six weeks, I moved them to a larger pen made of one inch wire. By this time they left the hen, to her discomfort, and roosted in the bushes.—L. A. Ward.

FALL ARRIVAL OF THE WILSON SNIPE.

The first Wilson snipe (*Gallinago delicata*) which I noted this fall were seen on Winters Island, Contra Costa County, September 27, 1915. On this date about eighteen birds were seen. On October 3, snipe were again seen, but in fewer numbers.—H. E. Foster.

MALFORMED ANTLERS.

It is a well known fact that the antlers of a deer are connected with the sexual organs in such a way that any change or injury to these organs is quickly reflected in the horns. The accompanying photograph (Fig. 14) shows the malformed antlers in the velvet of a black-tailed buck (*Odocoileus columbianus columbianus*) which showed injury of this kind, taken in the Alameda County hills. This is the fourth malformed deer head I have handled in the last three years, all killed in California within a six-mile radius. If the velvet were rubbed off there would be two hundred and two perfect little points from one-half to one and one-half inches long. The main tines measure fifteen inches in length and fork about half way up. The velvety condition almost gives the antlers the appearance of a sponge.—F. D. Hoyt.

Fig. 14. Malformed antlers of black-tailed buck deer taken in Alameda County, California. Photograph by F. D. Hoyt.

WILD LIFE IN RELATION TO AGRICULTURE.

ARTIFICIAL VS. NATURAL METHODS OF INSECT CONTROL.

Mr. E. G. Dudley makes the statement in the SIERRA RANGER (May, 1915) that there are two ways in which the forest may be protected from bark beetles: "One is to burn the host trees when they are found harboring the broods, and the other is to raise and liberate woodpeckers to feed upon the larvæ. Under the present system of burning the host trees, the woodpeckers are becoming reduced in numbers, owing to the cutting off of their food supply." An interesting problem is here presented and one which should be thoroughly studied. The tendency up to the present has been to make use of the artificial methods of control. Optimism as to the results of such methods is rife. Meanwhile some of our best bird friends are left to starve to death. The solution of the problem is difficult, but not impossible.

THE RING-NECKED PHEASANT AS AN INSECT DESTROYER.

A recent report of the Massachusetts Commissioners of Fisheries and Game (Hons. No. 2049, January, 1913) defends the ring-necked pheasant as a valuable insect destroyer. Stomach examination of wild birds taken in March showed that they had been feeding to a considerable extent on certain weeds and grain, but that in addition they were taking such pests of the garden as tomato worms, wireworms, cutworms, potato bugs; such fruit pests as plant lice, codling moth, tent caterpillars, and tussock moths, and such other pests as mosquitoes, house flies, gypsy and brown tailed moths, and elm leaf beetles.

Mr. W. L. Finley, state biologist of Oregon, is quoted as follows: "Examination of a number of Chinese pheasants' stomachs show that they eat a considerable amount of wheat, oats, peas and corn, but this damage is far overbalanced by the amount of noxious weed seeds, especially the Scotch thistle, which they destroy. They also destroy large numbers of injurious insects, such as crickets, grasshoppers, snails and cutworms. A female pheasant, killed November 1, had thirty-four grasshoppers, three crickets, and eight beetles in its crop, besides 280 noxious weed seeds. Another crop taken in November contained 303 cutworms and sixty blue-fly larvæ."

DUCKS VS. RICE.

Newspapers delight in exaggerating greatly the damage done by ducks in the rice fields of the Sacramento Valley. Many reports have recently appeared stating that thousands of dollars have been lost through the depredations of these birds. The injury actually done, however, is almost negligible, as is evidenced by the following quotation from a letter received from W. K. Brown, manager of the Moulton Irrigated Lands Company: "While this year's harvest is our fifth crop of rice, I have never been able to discover any material damage that the ducks have done. In my opinion the rice which the ducks eat is that which has already been knocked out of the head by the blackbird."

Mr. M. L. Carr of Colusa also writes: "This is to certify that the report recently made that I had lost 100 acres of rice by the wild ducks this year is absolutely false. The ducks did me no damage whatever."

Deputy S. J. Carpenter made a personal investigation on the Blevins and Mallon tract and found that the ducks were not damaging growing grain. The grain that the ducks were feeding upon was the waste caused by cutting or threshing or that which had been knocked out of the heads by blackbirds.

It is true that the gullets of many ducks killed this season have been filled with rice, but this was evidently gleaned from the ground and not from the heads.

Wild ducks feed in the very same way on the rice fields as the geese do on the stubble fields; they are gleaners. The mowers and binders knock out a quantity of grain while cutting, and this consequently remains on the ground. And it is this grain that we find in the gullets of ducks and geese. People who do not understand the situation infer that because a mallard has a throat full of rice he has been lighting on the growing grain and destroying it. This is obviously ridiculous. And beside, as a matter of fact, ducks do not relish growing rice. It is too tough. Blackbirds do the most

damage to rice crops, for they pick the grain from the stalks before it is ripe and thresh large quantities out with their wings while feeding.—GEORGE NEALE.

BLACK BASS EAT MOSQUITOES.

Reading the very interesting article in the October number of CALIFORNIA FISH AND GAME by Mr. N. B. Scofield, in charge of the Department of Commercial Fisheries, regarding mosquito control by the use of the stickle-back fish in the bay region, brought to my mind that before the introduction of the black bass into the Sacramento and San Joaquin valleys the problem of mosquito extermination was one of the most vexed with which the health authorities had to deal. A large number of small lakes and ponds north and west of Sacramento City, caused by winter overflows, were the breeding places of myriads of these pests. Crowds of disease carriers would blow into the city, making it almost impossible for any one to rest night or day. However, a few years after the introduction of the black bass a noticeable decrease in the number of mosquitoes was apparent, until today it is an unusual occurrence to find them in this locality. Reclamation is no doubt responsible in some degree for the near extermination, but I attribute the almost entire absence of mosquitoes at this time to the presence of black bass in the overflowed waters. From my own observation I know that the young black bass, from feeding stage to a year old, feed on the larvæ of the mosquito. I have found the stomachs of the young bass gorged with the larvæ of the mosquito. I once placed over twenty small bass in a barrel of stagnant water alive with mosquito larvæ. In a day or two there was no sign whatever of any larvæ remaining.

Mr. Scofield notes that what adds to the difficulty of exterminating the malarial mosquito is the presence of rice fields in some of our worst malarial districts. Now, the waters adjacent to the rice fields, sloughs, creeks, and rivers, are literally alive with black bass. Every ditch contains them in some quantity. The fish come in from the large overflows below the rice fields and not from the intake above, as many people believe. As the water recedes the bass back into the drainage waters or overflows which comprise the duck shooting grounds of Sutter and Butte counties, or, at least, as many as can possibly back out without becoming stranded. Many black bass are reported to be lost in these places. If they have served their purpose of destroying the mosquito larvæ it is no loss, to my mind, to lose a few of the bass.

I have learned from some of the oldest residents in the Butte Creek section that many years ago, before the introduction of the black bass, it was almost impossible to live, owing to the enormous number of mosquitoes. So bad were they at times that stock were sometimes worried to death or drowned in seeking refuge from them in the water.—GEORGE NEALE.

COMPARISON OF LEADING FISH AND GAME COMMISSIONS OF THE UNITED STATES.

State	Area in square miles	Commission	Year	Number salaried employees	Amount salaries paid	Number game birds distributed	Number fish distributed	Arrests	Convictions	Licensed hunters	Licensed fishermen	Fines collected
California	155,980	State Fish and Game Commission.	1914	117	[illegible]	Saved for breeding, 1914	20,220,661	681	744	179,854	5,851 market 41,000 anglers	$[illegible]
Oregon	96,030	State Fish and Game Commission.	1914	35	[illegible]	3,045	38,181,607	265	367	80,320	50,000	
Maine	29,895	Commissioners of Inland Fisheries and Game.	1914	75-125	[illegible]		4,467,950	300	270	1,753		$[illegible]
Vermont	9,135	Department of Fisheries and Game.	Fiscal 1913-14		[illegible]		2,000,000		121	20,000		$40,751 21
New Hampshire	9,005	State Fish and Game Commission.	1914	10	$1000 00		7,000,000	125	103	28,000		$[illegible]
Ohio	40,760	Agricultural Commission—Fish and Game Division.	1914	40	[illegible]	12,000	200,000 *300,000,000	400	360	120,000	Commercial 15,000	$[illegible]
New York	47,620	Conservation Commission	1914	415	[illegible]	Eggs 31,541 3,064	*556,543,016		2,665	201,022	Nets only 1,128	$377,384 00
Michigan	56,915	Public Domain Commission.	1914	61	[illegible]		60,617,685	1,416	1,301	46,010	19,992	$122,426 15
Wisconsin	54,450	Fish and Game Warden.	1914	75-85	[illegible]		*247,079,876	992	732	172,753	Non-resident 20,527	$159,012 82
Illinois	56,000	Game & Fish Commission	1913-14	95	[illegible]	16,000	6,216,682			198,207	1,177	$[illegible]
Massachusetts	8,040	State Fish and Game Commission.	1914	75	[illegible]	4,200	27,957,150	483	469	68,000		$[illegible]

*Included a large proportion of pike, perch, white-fish and other almost microscopic eggs which are handled by the hundred million, where salmon and trout eggs are handled by the thousand.

[illegible]Per month. [illegible]Per day. [illegible]Per annum.

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

September 1 to November 30, 1915.

Offense	Number of arrests	Fines assessed
Game.		
Hunting without a license	61	$830 00
Deer, close season, killing or possession and sale	11	295 00
Female deer, spotted fawns, spiked bucks, killing or possession	21	750 00
Illegal deer hides and failure to exhibit skin and portion of head bearing horns	4	225 00
Ducks, close season, killing or possession, excess bag limit	10	100 00
Quail, close season, killing or possession, excess bag limit	24	600 00
Wild pheasant, killing	1	25 00
Rabbits, close season, killing or possession	5	110 00
Squirrels, close season, killing or possession	1	
Wild geese, close season, killing or possession	1	25 00
Wild pigeon, close season, killing or possession	1	
Shore birds, close season, killing or possession	16	125 00
Non-game birds, close season, killing or possession, shipping	10	180 00
Sea otter, possession	1	
Hunting game (quail) inside refuge	1	
Shooting at wild ducks from power boat in motion	2	75 00
Total game violations	170	$3,620 00
Fish.		
Angling without a license	15	$300 00
Fishing for profit without license	31	460 00
Dealing in fish without wholesale dealers' license	1	20 00
Underweight striped bass, taking or possession	5	65 00
Undersized black bass, taking or possession	1	
Salmon, close season, Fish and Game District No. 15, taking or possession	2	
Trout, excess bag limit	1	25 00
Underweight sturgeon in possession	4	80 00
Abalones, undersized, taking or possession	2	40 00
Lobsters, under and over sized, close season, possession and sale	4	145 00
Crabs, close season, possession	1	
Dried shrimp, possession, buying and selling; Chinese shrimp nets	9	70 00
Clams, undersized	1	5 00
Illegal nets	27	690 00
Fishing within 50 feet of fishway	1	
Dynamiting fish	2	
Allowing crude oil to pass into the bay	1	
Total fish violations	108	$1,885 00
Grand total fish and game violations	278	$5,105 00

SEIZURES—FISH, GAME, AND ILLEGALLY USED FISHING APPARATUS.

September 1 to November 30, 1915.

Fish.

Striped bass	410 pounds
Salmon	574 pounds
Trout	59 pounds
Miscellaneous fish	11 pounds
Dried fish	50 pounds
Clams	50 pounds
Crabs	1,266
Shrimp	894 pounds
Abalones	4
Lobsters	114
Illegal nets and traps	12

Game.

Deer meat	550 pounds
Hides	5
Quail	52
Ducks	2,118
Geese	953
Cottontails	36
Doves	27
Shore birds	55
Non-game birds	42
Miscellaneous game	24

Searches.

Illegal fish and game	40

FINANCIAL REPORT.

Statement of Expenditures for the Months of August and September, 1915.

	August	September
General administration, salaries, traveling expenses, rentals, supplies, etc.	$1,703 03	$1,781 39
San Francisco District, salaries, traveling expenses, rentals, supplies, etc.	5,091 61	5,586 91
Sacramento District, salaries, traveling expenses, rentals, supplies, etc.	4,108 79	4,011 32
Los Angeles District, salaries, traveling expenses, rentals, supplies, etc.	1,931 32	1,758 79
Fresno District, salaries, traveling expenses, rentals, supplies, etc.	1,709 64	1,710 97
Hatchery administration, salaries, traveling expenses, supplies, etc.	451 08	381 44
Fishery research and publicity, salaries, traveling expenses, supplies, etc.	426 20	469 21
Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc.	486 42	445 40
Fish transplanting, salaries, traveling expenses, supplies, etc.	419 26	501 50
Fish distribution cars (1 and 2), salaries, traveling expenses, rentals, supplies, etc.	2,883 70	1,918 60
Fish patrol launches, salaries, traveling expenses, rentals, supplies, etc.	322 19	258 13
Sisson Hatchery, salaries, traveling expenses, supplies, etc.	3,127 42	2,160 03
Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc.		
Tahoe hatcheries, salaries, traveling expenses, supplies, etc.	358 41	310 79
Price Creek Hatchery, salaries, traveling expenses, supplies, etc.		
Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc.	168 74	6 70
Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc.	149 26	30 00
Bear Valley Hatchery, salaries, traveling expenses, supplies, etc.		
Game Farm, salaries, traveling expenses, rentals, supplies, etc.	527 53	491 54
Game research and publicity, salaries, traveling expenses, supplies, etc.	282 83	346 76
Prosecutions and allowances	251 30	57 15
Hunting license commissions and refunds	529 90	1,109 80
Anglers' license commissions and refunds	97 10	764 70
Market fishing license commissions and refunds	60 10	29 70
Crawfish and abalone inspection	200 00	200 00
Mountain lion bounties	200 10	480 00
Printing and lithographing		
Totals	$25,286 94	$26,982 61

Balances September and October, 1915.

	September		October	
Support and Maintenance of Hatcheries Fund—				
In state treasury	$22,687 88		$27,947 88	
In bank	5,200 00		2,390 00	
		$27,887 88		$30,337 88
Fish and Game Preservation Fund—				
In state treasury	$68,264 56		$55,195 83	
In bank	4,885 00		2,260 00	
		$73,149 56		$57,455 83
Totals		$101,037 44		$87,793 71
Less monthly bills		25,286 34		26,383 61
Balances		$75,751 10		$61,410 10

CONTENTS.

		Page
SHAD IN CALIFORNIA	*H. B. Ridever*	59
DOES THE GRIZZLY BEAR STILL EXIST IN CALIFORNIA?	*Joseph Dixon*	65
THE CALIFORNIA VALLEY ELK	*Burton Warren Evermann*	70
THE NEED OF CO-OPERATION IN FISH AND GAME PRESERVATION	*Ernest Schaeffle*	77
HABITS AND HUNTING OF THE SEA OTTER	*Chase Littlejohn*	79
CALIFORNIA'S PREHISTORIC GAME	*Harold C. Bryant*	82
EDITORIALS		83
HATCHERY AND FISHERY NOTES		95
CONSERVATION IN OTHER STATES		108
LIFE-HISTORY NOTES		110
UNITED STATES FOREST SERVICE CO-OPERATION		111
REPORTS—		
Seizures		113
Violations of Fish and Game Laws		114
Lion Bounties		115
Financial Report		116

Fig. 15. Shad (*Clupea sapidissima*), an unappreciated food fish in California.

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 2 SAN FRANCISCO, APRIL 15, 1916 Number 2

SHAD IN CALIFORNIA.

By H. B. Nidever.

The shad (*Clupea sapidissima*), which is found in such great numbers in the Sacramento and San Joaquin rivers, is not a native fish, but was introduced into our waters from New York about forty-five years ago (see Fig. 15). The undertaking of bringing out thousands of shad fry just hatched was one which seemed almost certain to result in failure, for fish culturists at that time had never tried anything approaching it in difficulty. The success of the experiment was

Fig. 16 Typical outfit of shad fisherman.

a great achievement in the art of fish culture and was due to the energy and initiative of the first California Fish Commissioners, Messrs. B. B. Redding, S. R. Lockmorton, and J. D. Farwell, and to the great skill of the famous fish culturist of Rochester, New York, Mr. Seth Green. Mr. Green and an assistant left New York on June 20, 1871, with 15,000 shad fry just hatched, contained in eight tin cans holding twelve gallons of water each. He arrived at Tehama on the Sacramento River on June 27, with 10,000 of the fry in good order. Before liberating them he found, on putting some in a glass of river water, that they began actively to feed on some minute particles in the water.

Mr. Green was afraid that the water, at that time very muddy on account of the mining operations, might not agree with them, but he hoped they might be wise enough to stay near the surface where the water was freer from mud. Accounts of this achievement were published in the report of the California Fish Commission for the biennial period, 1870-1871, and in the report of the New York Fish Commission

Fig. 17. Chinese shad saltery on San Joaquin River. Shad are salted here and exported to China.

for 1871. Extracts from these reports have been printed, along with much information regarding subsequent plants and their success, in a paper by Mr. Hugh M. Smith, entitled: "A Review of the History and Results of the Attempt to Acclimatize Fish and Other Water Animals in the Pacific States." This report appeared in the bulletin of the United States Fish Commission for 1891.

A second plant of shad was made by Mr. Livingstone Stone of the United States Fish Commission in 1873. This plant amounted to 35,000 fry planted in good condition in the Sacramento River near Tehama. All the subsequent plants of shad in California waters were made directly by the United States Fish Commission in the Sacramento River at Tehama. Between 1876 and 1880, inclusive, 574,000 fry were planted. The total number of young shad planted in the Sacramento River was 619,000. There have been no shad fry planted in California waters since 1880, and yet they are plentiful at the present time.

A few mature shad were caught in San Francisco Bay in 1873, the second year after planting. In 1874 and 1875 a larger number were caught. The number then steadily increased each year until in 1877 the California Fish Commission reported that they were becoming quite numerous. When the plants of shad were made the fry were taken up the Sacramento as far as Tehama before liberating because, as it was stated, "the instinct of the shad is, like that of the salmon, to return to spawn at the same place where it was hatched." The shad have not returned unerringly to the waters of the Sacramento, for the San Joaquin gets its full quota of shad and they are scattered along the coast, some having been taken in the Columbia River in 1876 and 1877. There is no question but that these shad in the Columbia resulted from plants made in the Sacramento River, for there were no plants made in the Columbia River or any place but the Sacramento River until 1885. The southern range of shad at the present time is Monterey Bay, although a few stray ones have been reported by fishermen as far south as Newport Beach, in Orange County.

Shad first appeared in numbers on the markets in California in the spring of 1879, when several thousand were sold in San Francisco. In 1886 the California Fish Commission estimated that in that year a million mature shad were taken from the waters of the State. From the time they were first introduced in our waters they have steadily increased until now they have, without doubt, reached their maximum height of production. When shad first became of real commercial value and were being sold in the California markets, the price was very high, as they were still quite scarce and the demand for this fish, then regarded as a curiosity, was very great. Instances are recorded where from $10.00 to $15.00 was paid for a single fish. Many brought from $1.00 to $1.50 per pound. By the year 1880, the number had so increased that consumers could obtain them for 20 cents to 25 cents per pound. By 1888 they could be obtained for 10 cents per pound, and during the height of the run the markets would become glutted and the price would fall to 5 cents per pound. As they increased from year to year the price gradually dropped until the wholesale price had fallen to 2 cents or less in 1894, about the same as we have today during the height of the run, and many fish could not be disposed of at any price. On the Columbia River the increase was about the same as on the Sacramento and the fall in price has corresponded to that in California. Just why this condition should have come about is perplexing. There can be no doubt that the shad have now the same good food qualities that they had when they were first caught in California when the retail price was $1.00 a pound.

The latest available statistics on California fisheries are those of the Bureau of Census for 1908. In that year 1,169,000 pounds of shad were caught in this State which was valued at $12,000.

From the time shad became abundant in our waters up to 1912 they were utilized almost entirely by fresh markets. But in the spring of 1912 several salting stations for shad were established on the San Joaquin River by Chinese companies (Fig. 17, *a* and *b*). These continued for only two seasons, for they did not seem to pay. Later a salt shad market was established in China and practically all the California fish were shipped there. Several local salmon packers have now taken up the dry-salting of shad and have packed many tons during the last two or three years, which they have sold through Chinese brokers in San Francisco. Fishermen get one-half to one and one-half cents per pound for shad during the shad run. The roe shad brings one-half cent more per pound because the roe is removed before the fish is salted and either

Fig. 18. *a*. Spawning grounds of the shad in the delta region of the San Joaquin River. *b*. Fishermen's arks along the Sacramento River. These floating houses are the homes of the river fishermen for the greater part of each year.

canned, shipped East in cold storage, or sold fresh in the local markets. Considerable quantities of shad-roe have been canned on the lower Sacramento River during the last two years. During the spring of 1915, 100,000 pounds of shad roe were shipped or sold in local markets. 606,048 pounds of shad roe were canned in one-half pound cans, 5,400 cases of shad were canned, and 2,400,000 pounds round fish were dry salted.

The principal shad fisheries of California are in the upper San Francisco Bay and in the delta region of the Sacramento and San Joaquin rivers. The vast delta basin of the lower San Joaquin has proven an ideal spawning place (see Fig. 18, *a* and *b*). Shad are occasionally taken in Monterey Bay, but these are utilized by the fresh markets, for they are here taken when they are not running in large numbers in the rivers. Shad ascend the Sacramento River for 300 miles or more. Here they are caught in bass or salmon nets. Because of the inconvenience of shipping from this district and because of the low prices prevailing, extensive fishing is here hardly warranted, and often after the fish are caught they are dumped overboard.

Shad fishing in California is practically all done with drift gill nets having a drawn mesh of from 5½ to 6½ inches. The regular salmon boat (Fig. 16) and gear are used, but the gill net is of smaller mesh and of somewhat lighter twine. The nets are from 150 to 350 fathoms long and 25 to 65 meshes deep.

There is but one distinct run of shad into the Sacramento and San Joaquin rivers each spring and this lasts about three months, beginning about the first of March and lasting until the first of June. The height of the run is in April. A few shad, however, are taken in striped bass and salmon nets practically the year round.

It seems strange that with the occurrence of the shad in abundance in California its desirability as an article of food has fallen so low. Shad in the eastern states are considered a luxury, and the western shad is thoroughly equal in quality. It seems strange, too, that, considering the present high price of most of the other fish as well as the high price of meat, a fish with the food value of the shad should not be

Fig. 19. Mending shad nets.

put to more profitable use than dry-salting for the markets of China. The shad is more difficult to prepare because it is more bony than other fish, but the flavor is unsurpassed and should outweigh the difficulty of preparation. The feeding habits of the shad are likewise in its favor. This fish spends the greater part of its life along the ocean shore and feeds principally on shrimps, sand-fleas, and other crustaceans. It comes into fresh water for only a short stay during the spawning season and returns thereafter to the ocean. During its stay in fresh water it feeds but little, if at all.

The unpopularity of the shad seems traceable to three factors: first, the abundance makes this fish undesirable; second, the delicacy of the fish makes it more difficult and more expensive to get them to the consumer in attractive form; third, the boniness of the fish has prejudiced the public against it. All of these objections could be largely overcome.

The glutted condition of the shad market at the height of the spring run can be relieved if the public can be made to realize the delicacy and the high food value of this fish and if they can be kept informed, through advertising, of the state of the market and of the low prices at which the fish can be bought. The difficulty of handling and shipping can also be remedied. Shad are now shipped in much better condition

Fig. 20. Fisherman unloading his catch of shad at Boulbin Island on the San Joaquin River.

than they were a few years ago and can be had in good sanitary condition any place in the State where a demand is created for them. The difficulty of preparing the fish and removing the bones can be obviated by proper splitting and dressing before cooking and by proper carving before the fish is served.

California should avail herself of her valuable resource of shad fisheries, a truly enviable resource which at the present she is, to a large extent, wasting.

DOES THE GRIZZLY BEAR STILL EXIST IN CALIFORNIA?

By Joseph Dixon.

[Contribution from the Museum of Vertebrate Zoology of the University of California.]

So conspicuous an animal as was the grizzly in the early days of California would seem hardly able to occur at large in any part of the State at the present time without the full knowledge of people living in the vicinity. Yet great tracts of wild mountain land, almost inaccessible and practically in its primitive condition, still exist in remote portions of California; and from time to time rumors reach the newspapers, and are eagerly printed, setting forth with more or less circumstance an encounter of some hunter with an alleged grizzly. In several instances where attempts have been made to "run down" these rumors, failure has resulted from inability to find the man or men said to have vouched for the story. The case dealt with in the present paper broke the record, in that as a result of the inquiry, not only the man was found, but the skull and head of the animal in question was secured for scientific comparisons.

On December 2, 1915, the State Fish and Game Commission received a letter from Deputy Fish and Game Commissioner H. S. Prescott, of

a

b

Fig. 21. Profile across top of skull between eyes, black and grizzly bears; natural size.
a. Black (cinnamon) bear, No. 22978, Mus. Vert. Zool., head of Boulder Creek, Humboldt County, California.
b. Alaska grizzly bear, No. 4705, Mus. Vert. Zool., Yukon Valley, Alaska.

Crescent City, Del Norte County, California, to the effect that John McMillan, of Requa, in the same county, had informed him that a grizzly bear had been killed by Leslie Fearrien on "Tom Bair's Range," at the headwaters of either Boulder Creek or Redwood Creek, in Humboldt County.

On December 13, 1915, Mr. H. E. Wilder, of Carlotta, Humboldt County, wrote to the Director of the California Museum of Vertebrate Zoology detailing the following report, which had come to him. That the two accounts pertain to the same incident is obvious.

Mr. Fearrien, who is foreman and professional hunter on the Bair Range (stock ranch) on Boulder Creek, bayed a bear with a pack of twelve dogs; the animal refused to run, but calmly faced the dogs,

killing four and crippling others before the hunter arrived and shot him. All who saw the bear, including Fearrien, who had killed upwards of one hundred bears, commented on its peculiar color and great size. The skull also was claimed to be different in shape from any of the black bears killed in the region. They estimated the weight to be between 900 and 1,000 pounds. The head was taken home and weighed 50 pounds. Fat to the extent of 250 pounds was also taken home. The fur was in poor condition and the skin was not saved. According to this report as it reached Mr. Wilder, all who had seen it pronounced the bear to be a grizzly. Addresses and other useful information were supplied by Mr. Wilder.

The explicitness of the above two reports is seen to have been unusual, and hence to warrant extra effort in following them up. Letters were promptly written to all the parties concerned, without, however, within a reasonable length of time, eliciting any replies. Through the especial interest of Miss Annie M. Alexander, and at her suggestion, the writer was then detailed to go to Humboldt County and ascertain the facts. The trip occupied the period from January 13 to 18, 1916.

Fortunately I was able to find both of the men most intimately connected with the incident: Mr. Albert L. Fearrien, who shot the bear, and Mr. Fred Bair, who mounted and now owns the head. The former was in Eureka at the time of my visit, the latter at his ranch on Mad River, near Maple Creek post office. Through the kindness of Mr. Bair I was enabled to take the mounted head back with me to the museum at Berkeley where the skull could be removed, examined and compared with the numerous specimens of grizzly, black and brown bears in the museum so that its identity might be established with certainty. Mr. Fearrien related the essential facts of the case to me, as follows:

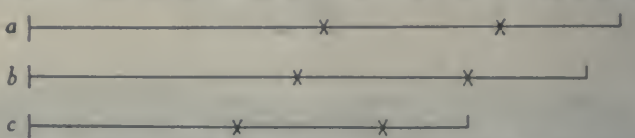

Fig. 22. Relative length of the three upper back teeth in grizzly and black bear skulls; natural size.
a. Grizzly from Idaho, No. 4832, Mus. Vert. Zool.
b. Alaska grizzly, No. 4705, Mus. Vert. Zool.
c. Black (cinnamon) bear, No. 22978, Mus. Vert. Zool.

The bear, a large male, was killed about six miles below the head of Boulder Creek, a tributary of Mad River, Humboldt County, California, on November 6 or 7, 1915. Fearrien was out with the dogs hunting for coyotes. The dogs struck a "hot" trail and disappeared around a bend in the river, while Fearrien struck across the ridge in the hope of heading them off. He found he could not cross at this point, however, and so turned back and followed along the bed of the stream. All five dogs were heard when they first bayed the bear, but soon only two were barking. At this point five more dogs were turned loose and they reached the bear in advance of the hunter. The latter did not know that it was a bear, not a coyote, until he arrived at the scene of combat, after a hard scramble over rough rocks. As he rushed up he saw the dogs fly at the bear's neck, and saw the bear seize them one after another with his paws and chew them to pieces. Six dogs were killed before the third shot struck the bear in the neck and ended the

fight. The dogs were accustomed to taking hold of ordinary bears, and flew unhesitatingly at this one, only to find that it proved too much for them.

Upon skinning the bear Fearrien found that the first two bullets of the 30-40 (1906 rimless) had gone through the bear's body behind the shoulders, one bullet going clear through while the other lodged in the shoulder blade on the farther side. The dead bear was dragged or rolled out on a gravel bar and skinned. The head and part of the neck attached was taken to the ranch without being skinned and "weighed 50 pounds." The fat that was saved "weighed 250 pounds," while the bear was *estimated* to have weighed about 950 pounds when alive.

Numerous cattle had died on the higher ranges from eating larkspur, Mr. Fearrien said, and he attributed the fatness of the bear to this plentiful food supply. The ranchmen had seen and heard nothing of this particular bear previously; he had certainly not been bothering the sheep, as far as they knew, although they had sustained considerable damage from bears at one time or another. The pelage of the bear consisted only of guard hairs with little or no under fur, so the skin was considered of little value and was given to an Indian to tan. It spoiled during the process, and when someone went to get the claws he was informed that the skin had washed away down the river.

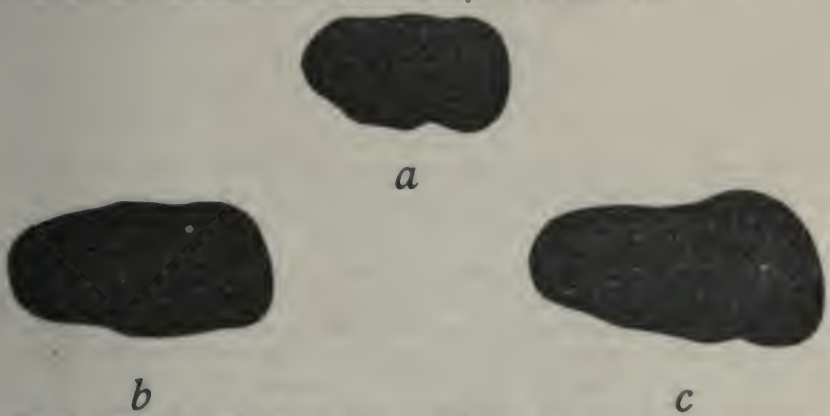

Fig. 23. Outline of left back upper molar tooth in black and grizzly bears; natural size.
a. Black (cinnamon) bear, No. 22978, Mus. Vert. Zool.
b. Alaska grizzly, No. 4705, Mus. Vert. Zool.
c. Grizzly from Idaho, No. 4832, Mus. Vert. Zool.

None of the men that I interviewed were in favor of protecting bears as big game mammals. They were men who lived in the eastern part of Humboldt County on the land that they owned and upon which they paid taxes. These men were the ones who were in closest contact with bears the year through. As the principal industry of a great part of that country is stock and sheep raising, it is no small wonder that there is little sentiment in favor of protecting bears. The professional hunter and trapper, or city sportsman, would doubtless view the matter from a different angle. The impracticability of raising bears, hogs and sheep on the same range seems too evident to merit discussion, and the sentiment of the cattlemen was crystalized by Mr. W. J. Gordon, of Carlotta, who has been engaged in the sheep business for nineteen years, when he said: "They will be wanting to protect the coyote next."

That bears, of the black or cinnamon group, are far from extinct in Humboldt County, will be easily proven to anyone who will take a trip through the back country. He will probably actually see no bears, for they have learned to keep out of sight; but tracks in the road made during the night are of every-day notice, and during the winter season mangled sheep give gruesome evidence of their presence. According to Mr. Gordon, a large part of the damage is caused by the sheep becoming panic-stricken when a bear invades a flock, the sheep thereupon stampeding, often jumping off high banks or piling up in deep gullies in their mad haste to escape.

That true grizzlies once occurred quite commonly in the more open parts of Humboldt County, such as the Eel River Valley, seemed to be abundantly borne out by what numerous old settlers told me, and inasmuch as the stories coincided as to essential facts, I see no reason for doubting them. I could not ascertain any definite records of real grizzlies having been killed in the county during the past 26 years, and most of the grizzlies referred to were killed 40 and 50 years ago.

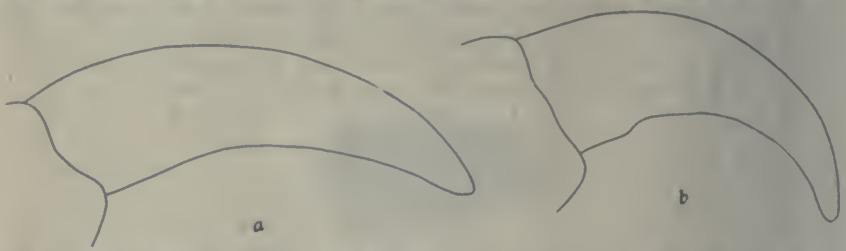

Fig. 24. Outline of typical claws of grizzly and black (cinnamon) bears from California; twelve-thirteenths natural size.
a. Third right claw (front foot) of grizzly from Kern County.
b. Third right claw (front foot) of black (cinnamon) bear from Siskiyou County.

The skull of the Humboldt bear which was at the bottom of the present inquiry, upon being removed from within the mounted head, revealed characters which placed it at once and clearly with the black (or cinnamon) group of bears and not with the grizzlies. As an example of Mr. Fred Bair's generosity, so well known in the region, the skull upon which this investigation is based is now number 22978 in the California Museum of Vertebrate Zoology at Berkeley, where it can be examined by whomever wishes at any time in the future. The brain case, above the eyes, is very high and rounded, with a slight medial depression (see Fig. 21, *a*). This "high-brow" character of the black bears of the North Pacific Coast region has been noted by scientists and has been deemed of such importance that this form of bear has been called *Ursus americanus altifrontalis*, or "high-browed" black bear. Contrasting to this, the usual grizzly bear skull is flattened, with a decided depression or trough between and above the eyes (see Fig. 21, *b*). The Humboldt skull, like other black bear skulls, has a very short muzzle as compared with the grizzly skulls. The size of the back teeth or molars is much greater in grizzlies than in black bears. The upper *back* molar is extreme in this particular (see Fig. 23, *a*, *b* and *c*), and even in skulls of approximately the same size, this tooth is usually about one-quarter of an inch longer in a grizzly than in a black bear.

The longest upper back molar of a black bear that I have found in the museum collection measured, in length, one and three-sixteenths inches, or thirty millimeters. The shortest corresponding tooth that I have found in an adult grizzly was over one and five-sixteenths inches, or thirty-four millimeters in length. The combined length of the three upper back teeth seems to be a good index to the length of the muzzle of the bear. In adult grizzlies these teeth measure at least one-half inch more, in length, than the corresponding teeth in black bears. This difference is shown in Fig. 22, *a*, *b* and *c*.

Considerable importance was attached by local people to the high ridge or sagittal crest on the Humboldt skull. This feature is pretty sure to be an age character, however, and seems to be most highly developed in old males. It is not a distinctive grizzly character, as it is often considerably higher, in proportion to the size of the skull, in certain black bears than it is in many grizzlies.

The claws of the front paw of a California grizzly from near Fort Tejon, Kern County, are long and only slightly curved (see Fig 24, *a*), while those of the black (or cinnamon) bear average shorter and are much more curved (see Fig. 24, *b*, which is a typical northern California cinnamon bear claw).

As far as California is concerned, brown or cinnamon bears may be considered as of the same species with black bears. They have been generally believed to be simply color phases of the black bear. The pelage of the Humboldt bear was cinnamon-brown on the neck and head, with the hairs about the nose and lips much lighter in color.

No one regrets more than we do here at the Museum of Vertebrate Zoology, that the Humboldt bear turned out to be a black bear instead of a grizzly, as especial watch has been maintained for several years in hopes of securing a complete grizzly (skull, skin and skeleton) from California, which might thus be preserved for the State as an example of what was once our most noteworthy mammal. *Definite* information regarding either the past or present occurrence of grizzly bears within the State will therefore be much appreciated if sent to the Museum of Vertebrate Zoology, University of California, Berkeley, California. Any large, brownish bear with long, slightly curved claws and the following skull characters is worthy of being brought forward as a grizzly candidate: (1) a long muzzle and low forehead with depression or trough above and between the eyes; (2) three upper back teeth, totaling more than two and three-quarters inches in length; (3) upper back tooth measuring more than one and one-quarter inches in length.

February 5, 1918.

THE CALIFORNIA VALLEY ELK.

By Barton Warren Evermann,

Director of the Museum, California Academy of Sciences.

In California Fish and Game for April 10, 1915 (Vol. I, No. 3, pp. 85-96), a brief account was given of the former distribution and abundance of the California valley elk (*Cervus nannodes*). In that article evidence was presented convincingly showing that this fine animal formerly ranged over the entire San Joaquin Valley and adjacent foothills, and through Livermore and Suñol valleys across to the Santa Clara Valley and even to Monterey where Don Sebastian Viscaino found them abundant when he landed there December 10, 1602. Evidence was also presented showing that the range of this elk extended well up into, if not throughout, the Sacramento Valley.

Throughout most of its range the species was very abundant in those early days and it continued to be abundant in the San Joaquin Valley at least as late as the early fifties. With the rapid increase in popula-

Fig. 25. California valley elk in corral at Buttonwillow, Kern County, ready for shipment. Photograph by John Rowley.

tion of California following the discovery of gold, the elk had a hard time of it, and their numbers rapidly decreased. Through persistent and more or less constant harassment they were soon driven out of the foothills and down into the valley where they found, when too hard pressed, a comparatively safe retreat in the tule marshes. But even there they were not secure. The eager hunters soon devised ways and means by which the animals could be followed into the tule lands, and their numbers went on decreasing. In the early seventies it is said only a few individuals were left of the once vast herds which only a decade or two before had roamed over the great interior valley. One report has it that there was but a single pair. This may not be literally true, but it doubtless correctly states the general fact that the species was almost extinct.

Then it was that a man of vision came upon the scene and saved this magnificent animal from complete extermination. That man was Henry Miller, the founder of the great cattle company of Miller and Lux, the greatest company of the kind in America, if not in the world. It was Henry Miller who saw the fate which inevitably awaited the California valley elk unless prompt action were taken to protect the few animals that were left. Fortunately, the few remaining elk made their last stand in the southern part of the San Joaquin Valley in the vicinity of what is now called Buena Vista Lake, and on land owned or controlled by Miller and Lux. There they had been able to secure a measure of safety in the willows and tules, but it was Mr. Miller's strict orders to the employees of the company that the elk must not be disturbed under any circumstances, that saved them.

In the article to which reference has been made, it is told how the herd increased in numbers until in 1914 there were probably more than 400 animals in it, how the herd was doing considerable damage each year to the alfalfa and Egyptian corn fields on the Miller and Lux Kern County ranch, and how the California Academy of Sciences undertook to reduce the herd somewhat by transferring some of the animals to suitable places in other parts of the State. It was believed that herds could be established in a number of reservations and parks in the State where they would thrive and thus establish several new centers for the propagation and preservation of the species. The thought was to increase as much as possible the conditions favorable to the preservation of the species. In pursuance of this policy 54 elk were distributed in the fall of 1914 to seven different reservations and parks. Many requests for elk could not be supplied at that time, the number of animals Messrs. Miller and Lux were able to capture not being enough to go around. Those who could not be supplied in 1914 were quite anxious to secure some of the elk and it was decided to make another distribution in the fall of 1915. This was done. Messrs. Miller and Lux again built a large corral near Buttonwillow in a field to which the elk were in the habit of coming at night to feed. The same method was followed as was pursued the previous year. A total of 100 animals were captured and 92 of these were distributed to 14 different places.

In order that the record may be complete there is given herewith a list of all the shipments for the two years, together with the available data regarding the present condition of the various herds. The distribution in 1915, as in 1914, was under the immediate direction of Mr. A. L. Bolton of the California Academy of Sciences.

Elk distributed in 1914 by the California Academy of Sciences:

1. Private unfenced reservation of 1,000 acres in the Santa Monica Mountains near Los Angeles, owned by Mr. J. M. Danziger, of Los Angeles, 3 males and 3 females.

On October 28, 1914, Mr. Danziger reported: "I believe the elk are going to stay where they were put on my place. They were seen the next day and I have traced their tracks up and down the road to water, which indicates they are staying there, and I hope they will become acclimated. My foreman was cutting alfalfa today, and one elk stood watching him at close range. If you can arrange to get me two more young ones, I shall be more than pleased."

On February 8, 1916, Mr. Danziger wrote: "We have not seen the elk for a long time. Since the winter rains came on, they apparently get all the feed they want in the mountain ranges, and do not come into the canyon. Of the elk that were shipped, I know that two have died. One got across the great valley between the mountain range in which I am situated and the range back of Playa del Rey. When I heard about this I sent a man to look after it, but the elk had either been shot or it died from lack of water. Then on a very foggy day when we could not see the city from our hills, one of the elk strayed away down across the inhabited valley just on the outskirts of the city of Los Angeles, and then people began chasing the animal and chased it clear into the heart of the city where it was finally lassoed by a motorcycle policeman, but it soon died."

2. Private reservation of 640 acres (enclosed with elk proof fence) in the Santa Monica Mountains, near Los Angeles, owned by Mr. E. L. Doheny of Los Angeles, 6 males and 4 females.

A report dated February 8, 1916, says these elk are doing well, and that several of them will have fawns very shortly, if they do not already have them. He can handle a few more at any time. The advantage is that his are within the great enclosure and can be seen at any time.

3. Private park of 700 acres belonging to Mr. S. C. Evans, of Riverside, 1 male and 3 females. This park is at the edge of the city of Riverside and is essentially a city park. On January 11, 1916, Mr. Evans wrote: "The four elk received by me have always done well and have never given me any trouble nor shown any inclination to jump the fence. These elk have become quite tame and are certainly a great attraction. I do not, however, think it safe for anyone to go inside the enclosure, at least without keeping a close watch, as the big bull will come toward one. His horns have come out very nicely and will soon be shed. One of the cows died without any apparent reason. She never did get as fat as the others, but seemed to be in good order and never showed any indication of sickness—we simply found her dead one morning. Up to the present time no fawns have been born, and I think perhaps I had better enlarge the enclosure to give them a little more exercise. (Up to this time Mr. Evans kept the elk in an enclosure of but a few acres.) I would very much like to receive two more. If at any time you are shipping grown ones this way and can not get young ones, I shall be glad to get the old ones, as I am anxious to make this a success."

4. Balboa Park, San Diego, 8 males and 4 females. On February 22, 1915, Mr. J. B. Pendleton, secretary of the Board of Park Commissioners, write: "Regarding the elk, I beg to advise that some of them seem to have been badly bruised either in catching them or in the corral, or in transit; three have died and two others are in bad shape. The elk have a splendid corral, are well cared for, and have become very tame. They create a great deal of interest among visitors. Those that remain should do well. We hope you may be able to furnish us a few more female elk."

5. Enslen Park, Modesto, 2 males. This is a city park containing about ten acres. Two males were supplied because in the 1914 shipments we had a surplus of males. On January 18, 1916, Mr. H. S. French, secretary of the Modesto Elks Lodge, which organization furnished the elk to the city, wrote: "I wish you could see the elk now. They have grown wonderfully and seem quite content and healthy. One had the misfortune to break about six inches off his first pair of antlers. They are quite tame. They will come to the fence and eat from your hand, if you offer them anything they really want. Their feed consists mostly of alfalfa hay and meal, crushed barley, and quite often vegetables of which they are very fond.

"We are very anxious to get two females and hope you may be able to supply them. At present the enclosure for the elk is a fraction under two acres, but if we receive the females the park commissioners will double the area."

6. California Redwood Park Association, Boulder Creek, Big Basin, 5 males and 5 females. On November 3, 1914, Mr. H. L. Middleton, a member of the Association who has taken an active and intelligent interest in stocking the Big Basin with elk, wrote: "We succeeded in transporting the elk from the car to their future home without serious accident to any of the animals with the exception of the very young one (a female) which died the day following their release. The two bucks fought viciously at times in the wagon, but since being liberated they seem to give one another no trouble."

On November 14 Mr. Middleton reported that another (a male) had died. "We are feeding the animals wheat and oat hay and have recently added alfalfa to their diet. They seem to eat well."

7. Del Monte Park, Monterey, 5 males and 5 females. This is the large reservation of the Pacific Improvement Company of 6,000 acres, through which runs the famous Seventeen Mile Drive. The elk were supplied to this park at the instance of Mr. Ney Otis, of Monterey, on behalf of the Monterey Elks lodge.

On November 19, 1915, Mr. S. F. B. Morse, general manager for the Pacific Improvement Company, reported: "The elk that we have are doing very well, indeed. I saw them only last Saturday and they were in splendid condition. We need more females and would like very much to receive some from you." A week later Mr. R. H. McKaig of the Pacific Improvement Company reported: "Of the ten elk turned loose in the forest last fall, one young doe died shortly afterward and we think she must have been injured in transit. One calf has been born and one cow is missing; we think she has been hiding with her calf somewhere in the forest and will join the herd later. We frequently see nine. They make their home in the sand dunes near the ocean. The last time I saw them they were very fat and healthy looking.

"We have heard of only one instance of any of the animals wandering away; that was when a bull wandered out of the forest into an alfalfa field in Carmel Valley, but he returned to the herd within 36 hours.

"The elk seem to be getting tame very fast. I have stopped my car within 50 feet of the whole herd and they did not seem at all troubled. As you doubtless know, the game in our forest is protected by rangers and we allow no shooting and no dogs."

On January 4, 1916, Mr. McKaig reported that the herd was in good condition. One calf had been born (sex not determined) and doing well. One adult female still missing. The animals find an abundance of food and it has not been necessary to feed them.

Elk distributed in 1915 by the California Academy of Sciences:

1. Mooney Grove, half way between Visalia and Tulare, 1 male and 3 females. This is a public park under the management of the Tulare County Board of Forestry, of which Mr. Thomas Jacob is the efficient acting president. It was through Mr. Jacob's interest in the matter and that of the Visalia Elks lodge that the elk were secured for this park.

On November 26 Mr. Jacob reported: "The four elk arrived in fine shape and were turned out in the park (10½ acres), an ideal place for them, I think; plenty of grass, water and shade."

2. Roeding Park, Fresno, 1 female. This park contains a total of 117 acres, of which about six acres were enclosed for the elk. The local Elks lodge co-operated with the city park commissioners in securing the elk. They desired two males and two females, but it was convenient to supply only one at this time. It is understood they already had a bull elk secured from some other source.

3. Zapp's Park, Fresno, 1 male. This elk was sent at the request of Mr. W. D. Wallis, of Miller and Lux Company. On January 13 Mr. Zapp reported: "The elk you sent me is doing fine. He has the run of ten acres. I also have a female; lost a male this summer. I received the pair five years ago from my uncle's ranch at Chico—the John Crouch ranch, four miles south of Chico on the Dayton road. I have never raised any young; I don't know from what cause."

4. Private park of P. H. Loinaz, Fresno, 1 male and 1 female, sent at the request of Mr. E. F. Ogle, of Miller and Lux. Reported to have arrived in good condition and doing well.

5. Private reservation of Mr. A. V. Lisenby, of Fresno, 1 male and 2 females. This ranch is in Madera County, eight miles from Friant. It consists of 1,800 acres in one tract and 320 in another near by. The elk arrived in good condition and were temporarily placed in an enclosure of about two acres which has since been enlarged to about 15 acres. Mr. Lisenby on January 4 reported that he was feeding them alfalfa hay and that they seemed to be doing very well indeed.

6. Alum Rock Park, San Jose, 2 males and 2 females. Mr. John Varcoe and Dr. Fred A. Curtiss, representing the Elks lodge of San Jose, and Mr. Walter L. Chrisman of the Board of Alum Rock Park Commissioners, co-operated in securing these elk for Alum Rock Park. This park is about seven and one-half miles northeast of San Jose. The elk were liberated in an enclosure of seven or eight acres. Mr. Elmer J. Ware, the park superintendent, reported on January 14 that "the four elk donated to Alum Rock

Park by the California Academy of Sciences reached the park in good condition and are doing very well." On February 23 Mr. Ware reported that "one of the male elk died last week. Do not know just what was the cause. The others are doing very well."

7. Petaluma City Park, 2 males and 10 females. Mr. E. B. Dykes, supervising principal of the Petaluma public schools and secretary of the Board of Park Commissioners, was active in securing this shipment for the city of Petaluma.

On December 21 Mr. Dykes wrote as follows: "One of the elk (a doe) sent us, died. It was in bad condition when delivered. We had a veterinary attend the animal but were unable to save it. He found, on examination, that its kidneys were in bad condition. It is possible that an injury was received in the car. The balance of the herd is apparently in good condition. The veterinary advised that we feed them less alfalfa. Will you please send me a number of copies of the article you published in CALIFORNIA FISH AND GAME on the Elk of California? I wish to interest the children in them."

On January 19 Mr. Dykes reported that the old buck which had had his horns removed had died. Mr. Dykes thinks both that died "were in bad condition when received and gradually grew worse. We were very sorry, indeed, to lose the big buck."

8. Eden Valley Ranch, Mendocino County, 2 males and 10 females. This ranch consists of about 25,000 acres, about 60 of which are under elk-proof fence. The ranch is owned by Hon. Wm. G. Henshaw and Mr. Henry D. Nichols, and is about thirty miles northeast of Willits.

On January 3 Mr. Henshaw reported that: "so far the elk are doing well." On January 27 he reported that 9 of the 12 had died. The winter in that region has been unprecedentedly severe, with the worst storms and heaviest snows that have been known for years.

When the shipment was made to this place it was realized that it was in the nature of an experiment and that the chances that the elk would survive were not good, the climatic conditions, the whole environment, being so decidedly different from that of the natural habitat of this species. Nevertheless it was felt to be worth while to try the experiment.

9. Del Paso Park, Sacramento, 3 males and 9 females. This park contains about 850 acres and is about five miles northeast of the city on the Auburn boulevard. The elk were secured through the co-operation of Mr. Frank F. Atkinson, secretary of the Board of Park Commissioners, and Mr. Walter Leitch, secretary of the local Elks lodge.

The elk arrived in excellent condition and were placed temporarily in an inclosure of a few acres. On December 4 Mr. Leitch wrote: "At a regular session of this lodge, held November 30, 1915, I was instructed by unanimous vote, to express to the California Academy of Sciences the thanks of this lodge for the magnificent herd of elk that was presented to our city by you through

the co-operation of Messrs. Miller and Lux. The animals arrived in excellent condition and have been placed in Del Paso Park where I can assure you they will be given the best of care and attention."

On January 5 Mr. Atkinson wrote that "One of the elk was so severely injured in transportation that it had to be killed shortly after arrival here. Our herd now consists of eleven head, all in good condition. We wish to thank the Academy of Sciences and Messrs. Miller and Lux for the courtesy extended in this matter and to assure you of our appreciation of the same."

10. California Redwood Park Association, Boulder Creek, Big Basin, 4 females, sent at the instance of Mr. H. L. Middleton, manager of the California Timber Company.

These animals apparently did not arrive in good condition. One of them died within a few days, and two others died some time before January 19.

In handling this shipment the railroad unfortunately took the car on to Santa Cruz and then returned it to Boulder Creek, thus keeping the elk on the road a needlessly long time.

11. Laveaga Park, Santa Cruz, 2 males and 4 females. This park is a public one belonging to the city. It comprises about 1,000 acres and is about one mile northeast from the city. About 25 acres have been enclosed with elk-proof fence.

It is said that the elk arrived in good condition and are doing well.

12. Casa del Rancho, near San Felipe, belonging to Mr. J. F. Dunne, 1 male and 4 females. This ranch comprises about 15,000 acres, and is entirely enclosed and protected from trespassing. The elk are temporarily placed in a lot of three or four acres, but will later be given a much larger area. On February 7 Mr. Dunne wrote that the elk were doing quite well.

13. Vancouver Pinnacles National Forest Reservation, 1 male and 3 females. This is a large national reservation of some 14,000 acres, in San Benito County. The shipment was made at the request of Mr. Elmer Dowdy, county clerk of San Benito County, Hollister, Mr. A. T. Hain, of Cook, and Mr. Henry Hollaway, of Gilroy.

No report has yet been received as to the condition of this shipment.

14. Balboa Park, San Diego, 3 males and 19 females. This is the large park of the city of San Diego. The shipment was made at the request of the Board of Park Commissioners through its secretary, Mr. J. B. Pendleton. The commissioners and the city were so well pleased with the small herd sent them in the fall of 1914 that they were anxious to receive more. They were particularly desirous of securing more females. No formal report has been received as to the condition of the herd, but people who have seen them say they appear to be doing well and are a great attraction not only to the citizens but to the visitors to the Panama-California International Exposition.

From the above it appears that the Academy has distributed 146 elk among 19 different reservations and parks in the State; that of this number 25 have died as a result of injuries received while being caught or because of unfavorable climatic conditions, or from unknown causes; that at least 3 fawns were born in 1915; and that the animals now in the various reservations and parks total at least 124.

The California valley elk is an extremely wild and nervous animal under natural conditions and peculiarly liable to receive injury in handling. It is regretted that several were lost, but the number is no greater than should be expected in handling animals of such delicate organization. When these elk become adjusted to their new environment it is hoped and believed their rapid increase will soon more than make good all losses that may have occurred.

It is estimated that the number left in the Kern County herd is between 350 and 400. These, together with these in the new potential centers of increase, assure with reasonable certainty the preservation of the species. In some of these centers it is believed they will become common within a few years. In the meantime the Kern County herd will go on increasing and will continue to do large annual damage to the alfalfa and Egyptian corn fields of that region.

THE NEED OF CO-OPERATION IN FISH AND GAME PRESERVATION.*

By Robert Schaeffle, Executive Officer, California Fish and Game Commission.

It is generally believed that almost any evil may be remedied through the enactment of a law and by the subsequent enforcement of the law by the police authorities. Ask the sportsman what he considers necessary to prevent the too rapid killing off of a species or what is desirable to accomplish the increase of another species and he will, nine times out of ten, reply: "Why, just pass a law shortening the season or one reducing the limit and then make the responsible officers enforce it, and the thing is done."

We have come to realize, however, that the thing can not be done so easily as it might seem. We certainly have plenty of fish and game laws; most officers are conscientious, reasonably well informed and intelligent; but still we are compelled to realize that laws are being violated every day and that the fish and game supply is suffering correspondingly.

Having thus admitted that police methods are not entirely sufficient in their present development, it becomes easier to work out the problem, ascertain each weakness, and prescribe the appropriate remedies.

It is axiomatic that no law is enforceable unless it really represents popular will. Furthermore, few laws are rigidly enforced unless the police officer feels that the public very strongly wants to have them enforced. Now, in the case of fish and game statutes, it at least seems that they have not always expressed public desire, and it is furthermore certain that the public does not, even yet, demand of every

*Reprinted, with permission, from *Pacific Outdoors*, February, 1916

responsible official that he do his duty by preventing and punishing infractions. In most cases, we have reason to believe, the regular fish and game warden not only is alert to prevent unlawful fishing and hunting, but expends even more than reasonable effort in the endeavor to apprehend and prosecute violators. But with the average sheriff, constable, marshal, policeman (including their many deputies), the case is radically different; these officials make no attempt to enforce game laws.

The State Fish and Game Commission tries to obtain a record of every prosecution made in the State for violations of the so-called "fish" and "game" laws. It is probable that the record obtained omits the inclusion of less than twenty-five cases annually, while it shows a total of around one thousand in each of recent years. As a mere matter of information, the following table is shown. It indicates the number of cases made since 1902, with a total around 10,000:

Biennial period,	1902-04	550 cases
Biennial period,	1904-06	774 cases
Biennial period,	1906-08	1,192 cases
Biennial period,	1908-10	1,771 cases
Biennial period,	1910-12	2,063 cases
Biennial period,	1912-14	1,993 cases
Yearly period,	1914-15	982 cases

For the calendar year 1915 cases made totaled 1,057.

This record is highly gratifying to everyone connected with the State Commission; it is believed that few states can show so good a record; but the chief value the figures have, to the writer's mind, is their potential power to arouse in the sportsman a determination that every police officer in the State shall in future do his full duty. Exact figures are difficult to obtain, but it is believed that the hundreds of sheriffs and constables must have at least twenty-five hundred salaried and unsalaried deputies. Each of these men has authority to enforce the "fish" and "game" laws, which comprise merely a small, withal important, chapter in the Penal Code of the State. Moreover, each and every one of them has taken his solemn oath to enforce the laws of the State. Whenever he fails or refuses to enforce a "game" or "fish" law, he violates his oath and is answerable to the public, and particularly to the sportsmen and others who are directly and most earnestly interested in keeping up the supply of wild life.

Now, there is something quite definite that the sportsmen—singly and collectively—can do to bring about a better condition. The sportsmen certainly favor law observance and enforcement, and by reason of their present intimate knowledge of the work of the State Fish and Game Commission realize that the seventy-five wardens maintained by the State can not be expected to deal with the possible and actual law-breakers scattered through the fifty-eight counties. What the sportsmen can do—and will do as soon as they are awakened to the needs of the situation—is to demand of every police officer the same interest and action that is demanded of the regular game warden. When the country constable learns that the sportsmen among his constituents will no longer tolerate his passive condition he will "stir himself" and treat fish and game cases as he treats larcenies and other serious offenses whose importance is due largely to public opinion concerning them. When we consider the average person's regard for property it is diffi-

cult to understand the apathy of the public, so far as fish and game is concerned. Undoubtedly, the conservationist's greatest work is to convince the American public that the wild life is public property, of value to the public, and deserving of even more attention and protection than is purely private property.

HABITS AND HUNTING OF THE SEA OTTER.

By Chase Littlejohn.

In the early days when venturesome navigators found their way to the shores of the northern Pacific, sea otter were found in great numbers on the Alaskan coast and southward as far as Lower California. At the present time what a change is found! Of the thousands formerly existing only single individuals are now found, and these are being killed so fast that total extinction seems but a short time away. So rare has this animal become and so prized is its fur that a skin which in 1880 sold for from $100 to $155, has now advanced to $1,500 and $2,000.

When Behring first visited Alaska from 1760–1765 he wrote that sea otters were so numerous that the Aleuts wore long mantles of their skins and the best ones could be purchased for a scrap of iron. In 1804 Baranov sailed from Alaska with a single cargo of 15,000 skins, and at the time the Fur Seal Islands were discovered two sailors killed 5,000 the first year. The next year less than 1,000 were taken, and from the end of the next six years until the present time not a sea otter has been known there. And so it has been at the other spots where otter were once abundant. In 1873, when the Americans purchased Alaska, nearly 4,000 skins were secured, and in 1880–1881, because of the persistency with which the animals were hunted by both whites and natives, between 6,000 and 8,000 were taken, some of which I myself secured and thus helped, I am ashamed to say, in the general extermination. By 1890 the use of the modern rifle and destructive nets had so reduced the income to be derived from sea otter hunting that the hunters were obliged to engage in other occupations.

Thirty-eight years ago, on the 18th of March, I sailed on my brother's ship on my first sea otter hunt. We sailed from San Francisco by way of the Sandwich Islands. The Kuril Islands were reached in May and we at once began the hunt. And truly exciting and dangerous sport it was! To hit with a rifle so small a mark as an otter's head (practically the only part to be seen) from a bounding boat was at first no easy matter; but with practice the otter soon stood but little chance when hemmed in between the boats. The hunting was both difficult and dangerous, for the waters about the Kuril Islands are at nearly all times very rough because of the violent winds and rushing tides. I saw one hunter caught in a tide-rip; his boat stood on end for a moment and then plunged beneath the surface. Many lives were lost in this occupation, and of the hundreds who followed it for a long period I am perhaps the only one left who can tell from personal experience about the life and habits of the nearly extinct sea otter. My own brother with his crew of about thirty men were the last otter hunters, so far as I know, to sail from San Francisco. The expedition left on March 1, 1889, and like many another unfortunate ship that

The sea otters were hunted always with three boats which formed a triangle, one boat ahead, and one on either side. When an otter was sighted, the hunter seeing it raised a paddle as a signal and all three boats would move off toward the animal. After approaching to within a reasonable distance, a shot was fired. The bullet, which usually struck near the animal, would so frighten him that he would dive at once, without taking time to inflate his lungs enough to take him any great distance. He could, therefore, not remain long beneath the surface. If he had taken time to draw a long breath he might have gone so far as to have entirely escaped the hunter's sight. If the animal was not captured after the first dive he was but rarely seen again. Swiftness of action is of the utmost importance in sea otter hunting. This accounts for the fact that three boats were always used. More boats would have caused too much complication; they would have been constantly in each other's way, the lives of the hunters would have been endangered by the firing, and the precaution needed to prevent loss of human life would have allowed the otter to escape. He would then have been given time to inflate his lungs sufficiently to make a long dash and possibly evade the hunter. When the otter is killed he floats, back up, and the body takes the shape of an inverted letter U, both ends down. This position causes the air to remain in the lungs and to act as a float. If by any chance the air escapes the body at once sinks and is lost.

Many of the otters not killed with a rifle were taken in nets. These were of large mesh and about six fathoms long and two fathoms deep. They were anchored at one end so as to allow them to swing with the tide and with the wind, which blew at times with terrific force. These winds were advantageous to the hunter, for it was during the wind storms that the otters were forced to seek shelter behind the reefs and rocks where the nets were spread. At night, when the animals dove for food, they were unable to see the nets and were soon enmeshed. In struggling to free themselves from this new species of seaweed, they attracted others of their kind and in the general excitement five or six otters were often caught in one net. At such times every one was for himself and a general fight took place. The infuriated otters would bite each other and the wooden floats on the nets and within a few hours all, or nearly all, were drowned.

The habits of the sea otter are extremely interesting. This animal always swims on its back with head turned upward. Consequently it swims backward, always, however, keeping an eye in the direction toward which it is going. When it is about to dive the otter turns over and goes under back up and remains so while under water, but immediately resumes the opposite position on reaching the surface. While under water, if not too far from the boat, the otter can be easily distinguished because it assumes a golden color and looks somewhat like a sailor in an oil-skin jacket, although in fact it is a deep black or dark brown.

The young of the otter are born, as far as I could ascertain, in the spring, and there is but one young per year. The mother is devoted to her offspring. She holds it in her arms and fondles and caresses it, and when danger approaches she risks her own life to protect it. At such times she at once makes off, sometimes swimming, but oftener

diving at short intervals, for she well knows that if she remains too long beneath the water the young will perish. Each time the surface is reached the little fellow utters a loud cry, and this at once attracts the attention of the hunter. To deaden the outcry the mother will often duck the head of her offspring beneath the water repeatedly. When the weather is foggy the only otter that can be chased with any degree of success is the mother with her baby, whose cries betray her.

In the early days of my hunting on the Japan coast we found the otters in their primitive state because they had never been hunted at sea. There we found them in "schools" and as many as 400 were sometimes seen in one school. Often just a family would be together—a father, mother, young of the previous year, and the baby. These when pursued would usually still band together, and the whole family would then be destroyed by the merciless bullets of the hunter. In Alaska, where the hunting had been carried on for years, the mother would often desert her young even before a shot was fired. The baby thus deserted, if only a few weeks old, would drown, but if two months old he could take good care of himself, for he can then dive from thirty to forty yards.

The food of the sea otter consists largely of sea urchins, for which the otter dives to the bottom. He comes to the surface with the food, places it on the breast, where it is torn in halves; the contents are taken from each half and the shells are tossed often to a considerable distance. The otter then washes and cleans his face and "hands" before diving for more food. Otters also eat seaweed and fish, but probably not much of the latter, with the exception of the squid, upon which they are obliged to subsist when driven far out to sea by constant hunting. They are unable to reach bottom when the water is much over sixty fathoms.

That sea otters eat codfish is in a measure proven by the following interesting incident: Our schooner was anchored about twenty miles from land in sixty fathoms of water. Codfish were abundant, and one man was fishing while a number looked on. The weather was extremely foggy, and presently a sea otter, drifting by and apparently mistaking the schooner for a rock, swam towards it. Rifles were at once secured, but in the mean time the otter had dived and was apparently lost. Presently, however, the fisherman got a bite, and after hauling in the fish for a considerable distance, was suddenly surprised to find the strain on his line greatly increased. We were all curious to see what he had hooked and found an otter clasping the codfish in his paws. A bullet soon ended his career.

The sea otter displays much common sense and sometimes remarkable strategy. Its greatest enemy other than man is probably the killer whale. This animal destroys great numbers of fur seal, which it finds easy prey. In the excitement of pursuit the seal makes a great commotion by leaping out of the water. This attracts the whale and the seals are soon dispatched. The sea otter likewise makes off instantly from this enemy, but if he finds that he has not evaded his pursuer he knows that flight is useless; he then doubles up as if dead and remains motionless. The whale does not eat carrion, and thinking this to be such, he passes on to locate the living otter that has seemingly escaped.

The natives formerly hunted the otter with skin canoes and used spears instead of guns. These they could throw with great accuracy

and for considerable distances. After the animal had received several spears in his body he was unable to dive and was soon dispatched with a long club. Each native had a private mark on his spear point and when the otter was killed the native who had struck his spear nearest to the otter's head claimed the skin. When muzzle-loading guns were used many otters escaped after being struck, for the bullets would sometimes barely penetrate the skin. I myself took several such bullets from otters which I secured and undoubtedly they had carried them beneath their jackets for many years, for such rifles had gone out of use before I lived in Alaska.

Only a few otters are now taken in Alaska, and I know of none taken about the Kuril Islands. Stringent laws have been passed to protect any that may be left along the California coast. We may hope, therefore, that this, the rarest and most beautiful of all fur-bearing animals, in time may be able to re-establish itself to such a degree that future generations may reap some benefit from its presence along our shores.

CALIFORNIA'S PREHISTORIC GAME.

By Harold C. Bryant.

A visit to the Museum of History, Science and Art in Los Angeles impresses us with the marvelous forms of animal life in prehistoric times. Imagine yourself in a region in which the elephant, mastodon and ground sloth tracked the wilds. Think of the exciting sport of hunting the saber-toothed tiger, cave bear, wolf and other carnivores once so abundant in this State.

Authentic evidence of the occurrence of these forms is furnished by recent finds in the oil fields, which have proven a great storehouse for prehistoric fauna of this State. Complete skeletons of all of the above mammals have been dug from the asphaltum of Rancho La Brea, near Los Angeles. Bones are piled thirty or more feet high and there seems to be no end to new discoveries. The teeth of the animals have been wonderfully preserved and in many instances not a bone is found broken.

We are led to conjecture why these many forms of life are now extinct; they were evidently not exterminated at the hands of man, and yet they are gone from the earth as completely as are those species which owe their extinction to the invention of firearms. The ebb and flow of life on the earth form an enigma which all our years of research and study have but slightly cleared up. This fact should drive us to work the harder to decipher some of the laws which govern animal life.

Nor should a knowledge that many forms of life have become extinct from natural causes lead us to think that living species are doomed to extinction and that the toll taken by man can make but little difference; for whereas, under natural conditions, the death of a species may have taken thousands of years, man is able to exterminate them entirely in fifty. Hence, we should remember that man is drawing upon the supply of wild life faster than the reservoir can be filled. The lifetime of a species is governed by a higher power than our own, and if we accelerate by artificial means the forces leading toward extinction, future generations will suffer for our thoughtlessness.

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

April 15, 1916.

FOREST SERVICE CO-OPERATION.

A NEW department in CALIFORNIA FISH AND GAME entitled "United States Forest Service Co-operation," starts with this issue. Co-operation, such as exists between the Fish and Game Commission and the United States Forest Service, is almost inevitable. Both forces are working for conservation of natural resources and these resources are mutually dependent. Forest Service rangers are deputies of the California Fish and Game Commission and have been a potent force in educating the public to the need and value of game conservation, as well as in prosecuting many violators of the game laws. This co-operation is greatly appreciated by the Commission, which in turn is anxious to be serviceable to the Forest Service in every way possible. This new department will afford an opportunity for forest officers to contribute information on the status of game and fish and on the administration of these resources in the national forests. Mr. J. M. C. Hodge, in charge information in this district, will edit the notes sent in by the forest deputies.

COMMISSION FEEDS DEER AND QUAIL.

The unprecedented snowstorms in the northern and mountain districts brought to light many interesting things in connection with our birds and animals and no doubt proved very enlightening. One of the things demonstrated was that the nonpredatory birds and animals nearly always seek aid from humans when hungry or in distress. Large numbers of deer, quail, and other birds came to ranches where domestic stock were fed. They also came to the edge of many towns as though looking for aid from the residents (see Fig. 27). The extreme conditions demonstrated that deer are much more numerous in northern California than was believed. Our private correspondence and reports from deputies tell of large bands of deer seen in Eldorado, Shasta, Lassen,

Fig. 26. Wild deer feeding in barnyard on ranch of A. K. Lea, Cloverdale, Sonoma County, California, September, 1915. Photograph by Mrs. A. K. Lea.

Modoc and Siskiyou counties. They tell of bands of deer being fed by cattlemen and farmers. All are authentic. For instance, it is reported that Mr. A. C. Sprout, of the California and Oregon Power Company at Copco, on the Klamath River, has fed approximately 300 deer.

Many residents of the northern counties undertook the work of voluntary feeding of game without any expectation of payment or reward, and although Mr. Newbert acted promptly in the matter, backed up by the Board of Control in allowing our estimate for the purchase of feed, it was owing to the prompt action of the residents in the different sections which our deputies could not reach and which were cut off from communication by mail, that enormous numbers of deer and quail were saved. The Sacramento office has written a large number of personal letters to individuals and newspapers thanking them for their co-operation and kindness shown during the trying period.—GEORGE NEALE.

PARCEL POST SHIPMENTS OF GAME.

The Fish and Game Commission has been making such a strenuous fight against the market hunters who ship their game to the San Francisco markets by express, that it has become exceedingly dangerous for the shippers to send illegally shipped birds by that method; the chances of having them confiscated are too many. Some of the hunters for a time resorted to the mails, sending birds by parcel post, knowing that the deputies of the Commission did not have the same opportunity to inspect postal shipments as they did express.

Investigation showed that according to the California law, all game offered for shipment must be at all times in open view. The postal regulations provide that game must be carefully wrapped in order to prevent damage to other mail matter. But the United States regulations also provide that all game offered for shipment must be strictly in accord with all of the provisions of the state laws.

How these conflicting provisions have been brought into accord is explained by the following letter received from the post office department at Washington:

WASHINGTON, D. C., January 28, 1916.
FISH AND GAME COMMISSION,
Mills Building,
San Francisco, California.

GENTLEMEN: Receipt is acknowledged of your communication of the 17th instant advising this office that

"Section 625*b* of the Penal Code of the State of California provides that game offered for shipment or transportation must be at all times in open view."

In reply I have to say that the Act of Congress of March 4, 1909, 35 Stat. 1137, embodied in section 477½, Postal Laws and Regulations, a copy of which is enclosed, prohibits the shipment of dead bodies, or parts thereof, of any game animals or birds killed or offered for shipment in violation of the laws of the state, territory or district in which killed or offered for shipment, and since the laws of the State of California do not permit the shipment of the dead bodies of animals or birds when wrapped, postmasters in that State must, of course, govern themselves accordingly. The dead bodies of wild animals or birds may be accepted for transmission in the mails only when wrapped so as to prevent injury to other mail, and it is not practicable to handle shipments of such matter by parcel post in the manner required by the California laws.

Respectfully,
[Signed] A. M. DOCKERY,
Third Assistant Postmaster General

OREGON PROTECTS FUR-BEARING MAMMALS.

Oregon in 1913 established a trapper's license law which requires every trapper who traps anywhere except on his own property, to procure a license costing one dollar. The fur-bearing mammals protected are the otter, mink, fisher, marten, and musk-rat. The open season is from November 1 to February 28. The flesh of game birds or mammals is prohibited as bait for traps. As a return to the trapper for his license fee the Fish and Game Commission is carrying on investigations which are of help to the trapper and is also accumulating data as to the number of fur-bearing mammals taken each year. The latter information is obtained by requiring each trapper to make a full report as to the fur-bearing mammals caught and killed during the open season. Despite the fact that certain raiders of the poultry yard are given protection as fur-bearers, the proviso that nothing shall prevent any person from

protecting his own premises from the depredations of fur-bearing animals appears to have secured popularity for this law. The State Biologist of Oregon recently stated that there is no opposition to this law by trappers, because they themselves advocated its adoption.

Each trapper now feels he has an equal chance at the fur-bearers, for summer trapping by the amateur has been abolished.

A law such as this should be considered for this State. California is wasting a valuable resource by a faulty administrating of her fur-bearing mammals. The black bear, mink, river otter, fisher, and red fox are among the fur-bearers which should be protected during the summer months when the fur is of no value; and a policy which will allow of a stocking up of this resource will help save it as a source of recreation and profit for the State.

ADMINISTRATIVE CHANGES.

At a meeting of the Board of Fish and Game Commissioners held January 15, 1916, the Fresno Division of the Commission was abolished. Mr. A. D. Ferguson, who has for many years been in charge of this division, was appointed Field Agent of the Commission, his duty now being the supervision of the field work of the deputies.

The State Board of Control has sanctioned the abolishment of the State Game Farm at Hayward. It has not been determined how soon the farm can be abandoned, owing to difficulties over the lease now held by the Commission.

NOTES FROM THE LOS ANGELES DISTRICT.

Southern California had the longest quail season in 1915 that has been enjoyed in years—two and one-half months. Shooting was good at the end and the best stock of breeding material left over that has been spared in many seasons, notwithstanding the two-and-a-half times as much hammering given to the quail here.

If any proof was needed that the past was an exceptionally good shooting season in southern California, it could be obtained from the sporting goods stores, which report a remarkable increase in the demand for small-gauge shotguns. There has been a steadily growing movement toward the use of less shot for game shooting as the limits went down, harmonious with the desire to do the limit thing in a little more difficult manner, so as to get in a larger satisfaction in bagging the few birds allowed. Hence, dealers in southern California are ordering hardly any 12-bore guns at all, except for trap shooting. All are going to the "sixteens" and "twenties." Some even take up "twenty-eights." This is all as it should be. The small-bore double gun is the modern sportsman's arm, and goes hand in hand with the reduced bag limit.

Southern division field patrolmen under Commissioner Connell's direction have paid particular attention to the along shore sea fisheries since the game season closed, and have made several good cases.

Deputy Becker has made it a rule to carry license books with him in the field, so as to supply any applicants in good faith with licenses. The State gets 100 per cent of such license collections, no commission being paid to salaried deputies.

E. HEDDERLY.

COLD WEATHER AND GAME.

The heavy snows of the past winter have, without doubt, made it difficult for many of the game species to obtain sufficient food. However, the newspaper reports to the effect that hundreds of deer and thousands of quail were dying of starvation in the mountain districts were in many cases greatly exaggerated. When some of the instances cited by newspapers were investigated, it was found that someone, either as a joke, or with malicious intent, started the rumor. In one particular instance investigation showed that the man who was quoted as saying that miners near Barden had been feeding over seven hundred quail and giving their last stock of oatmeal for this purpose, had not been anywhere near the place described and had simply invented the story. The report appearing in the CHICO RECORD that over a hundred deer were dying from starvation in the Butte Creek country was also found to be without foundation.

A report of the killing by predatory animals of large numbers of deer, weakened by starvation, was recently furnished a forest ranger by an inhabitant of the northern part of the Eldorado forest and later appeared in a Placerville newspaper. Investigation of the ground

Fig. 27. Valley quail being fed during January snow storm by Superintendent of Streets Edgar Thomas at Yreka, Siskiyou County, California.

for the report brought a letter from the forest supervisor, of which the following is an extract:

The information contained in the newspaper clipping was furnished one of the Eldorado forest rangers by Mr. Zoever, who resides the greater portion of the year in the northern part of the Eldorado Forest. I am not in position to vouch for the truth of his information. We have not received reports from other portions of the forest of deer having been killed by predatory animals. Mr. Zoever lives in an isolated portion of the forest in which there are no roads. Snow has fallen this winter to an unusual depth, and in all probability Mr. Zoever has greatly exaggerated facts, since he is well aware that forest officers have no work to perform in his locality during the winter months.

Additional information has strengthened this viewpoint. Hence, we are led to believe that in this case, also, exaggerated statements were made.

That the cold weather of the past winter was to some extent destructive to both deer and quail is, however, not to be denied. A few instances to this effect are here cited.

According to Deputy E. H. Ober, Inyo County has experienced an unusually severe winter. During January eleven feet of snow fell. He reports: "I covered over 125 miles on my skis and was constantly scattering feed and digging trenches for quail. I found the quail dead everywhere along the foothills. With deep snow covering the ground they seemed to have no way of getting food. A few birds got to the valley, but many were caught high up on the mountains. One small covey about three miles west of Big Pine, which I fed regularly, had in it, when I started feeding, thirty-five birds, but when I last saw them only twenty-five were left. We will probably lose about 85 per cent of our wonderful supply of mountain quail. We had more than 800 deer in our valley in herds ranging from 6 to 190. I saw a herd of 206 one day. We lost a few deer, but none to speak of."

Deputy L. J. Warren, of Taylorsville, Plumas County, reports that the severe weather in his district resulted in the destruction of many quail. He estimates the loss at about 20 per cent for the entire winter. The statement is also made that hawks and predatory mammals seem to take an especially large toll when the birds are snow-bound. During a storm Mr. Warren had 126 deer under daily observation. The loss was four.

Fig. 28. Severe weather in the Sierras. Note how completely the natural food supply of game has been cut off by the deep snow.

VALUABLE INFORMATION ON FISH AND GAME.

Through the co-operation of the United States Forest Service, valuable data as to the status of fish and game within the State are made available. Forest rangers are in a particularly favorable position to obtain information as to the game species found in the national forests and as to their condition at the present time. A circular letter asking for information on beavers, grouse, sage hens, and introduced game birds has brought information which could not otherwise have been obtained. The reports regarding beavers show that this valuable fur-bearing mammal is still to be found in many parts of the State, and that the protection now afforded it will, perhaps, be instrumental in allowing an increase in numbers. A map is being prepared to show the location of the various colonies within the State, and a full report as to the status of the beaver in California will soon be issued. The data obtained through the Forest Service is reliable and comprehensive and is invaluable in showing the adequacy of the present policy in relation to the administration of game resources and in pointing the way for the future.

JOHN X. DE WITT.

With sincere regret we record the death in San Francisco on January 7, 1916, of John X. DeWitt, sportsman and writer on fish and game. For several years prior to his death, Mr. DeWitt was editor of the sporting department of BREEDER AND SPORTSMAN and contributor to various San Francisco newspapers. His intense love of hunting and of the out-of-doors lured him to the open fields and to the swift flowing streams. Here his keen observation disclosed to him the secrets of the wild things of the open. This knowledge and his power of building words into beautiful pictures made what he had to contribute vital and worth while. To his love for the out-of-doors was added a love for his fellow man, which made all who knew him his friends.—J. S. H.

A HEARING AT SANTA ROSA.

Following the arrest of a Santa Rosa sportsman for capturing a steelhead trout by means of a grab-hook, considerable interest was developed in that city as to how trout may be distinguished from salmon. Many of the residents of Sonoma

County call the steelhead trout which runs in the Russian River, a salmon. In order that there might be a better understanding of the state fish laws, Mr. Walter Nagle, secretary of the Santa Rosa Chamber of Commerce, arranged a hearing at the courthouse. Dr. H. C. Bryant and Mr. N. B. Scofield represented the Fish and Game Commission. Over fifty men were present at the meeting and all showed interest in the proceedings (see

Dr. Bryant, who acted as chairman of the meeting, called attention to the educational work of the California Fish and Game Commission and made a plea for better co-operation in the enforcement of fish and game laws. Mr. Scofield then pointed out the differences between trout and salmon and suggested methods whereby these fish could be better conserved. When the meeting was thrown open a lively discussion took place as to whether

Fig. 29. Sixty men interested in the salmon and trout laws attended a hearing at Santa Rosa on February 9, 1916.

Figs. 29 and 30). Specimens of a steelhead trout and a quinnat salmon were on exhibition, and the distinguishing features of each were pointed out. The main points of difference given were as follows:

Trout.	Salmon.
1. *Habits.* Remains in fresh water until 2 or 3 years old; then goes to sea; returns to spawn year after year, developing more than one batch of milt and roe.	1. *Habits.* Goes to sea first year, where it remains from 3 to 4 years; then goes into fresh water to spawn, dying immediately thereafter. Only one batch of milt and roe.
2. Skeleton hard.	2. Skeleton soft and porous.
3. Anal fin square, with tip reaching beyond base; contains 12 or less rays.	3. Tip of anal fin not reaching to base; 14 or more rays.
4. Teeth present in middle of roof of mouth.	4. No teeth in middle of roof of mouth.
5. More slender in shape.	5. Less slender in shape.

salmon and trout should be taken with other than a spear or hook and line in the manner commonly known as angling. A vote taken showed those present in favor of the use of a gaff-hook as well as a spear. It was also voted that it be the sense of the meeting that "one" be made the limit for salmon and steelhead trout during the winter open season in district 2.

Such hearings as this not only stimulate interest in fish and game resources but have the added value of bringing to the Fish and Game Commission valuable suggestions as to needed laws. In the future, hearings of the same sort will be held in other parts of the State in order that mooted questions regarding fish and game and the laws protecting them may be settled.

Fig. 35. Interested individuals at the hearing at Santa Rosa, examining specimens of salmon and trout

GAME LAWS VS. KNOWLEDGE.

While the penalties of the law, no doubt, are effective in restraining a great many in the killing of game out of season, or in exceeding the limit of kill during a given period, the one thing which will offer more protection is the growth of knowledge and the development of a sense of honor and pride in relation to the protection of game.

The man who goes out and wantonly slaughters game for the love of killing needs a good strong penalty and is richly deserving of it, if such penalty overtakes him. That man needs understanding and a sense of honor which education of some sort can alone bring to him.—Bakersfield Californian, September 14, 1914.

SONG-BIRDS ARE KILLED.

A number of flagrant violations of the law protecting the song-birds of the State have taken place this past winter. Convictions have been obtained in practically every case. Between December 1 and March 1, sixty-five arrests were made and $793.50 in fines imposed. A large proportion of the hunters arrested were Italians who had been shooting robins. The accompanying photographs (Figs. 32 and 33) show birds confiscated. Forty-eight robins, a red-shafted flicker, and a California towhee were taken from two men who had been hunting in Contra Costa County, and twenty-eight robins, ready to be roasted, were confiscated from two men in Sacramento.

ATTEMPT TO ABOLISH KLAMATH LAKE BIRD RESERVATION.

The following letter from T. S. Palmer, in charge of game preservation, United States Biological Survey, explains the present status of the Klamath Lake Bird Reservation:

In reply to your letter of December 30th regarding the Klamath Lake Bird Reservation, I beg to say that last year the boundaries of the reserve were modified so as to eliminate certain lands to the southeastern part of the reserve which were desired for settlement and which were not especially needed for purposes of the reservation. This change in the boundary eliminated all private holdings and all lands on which any claims had been filed, with one or two exceptions. Recently a movement has been set on foot to secure the elimination of certain other lands and if possible to abolish the reservation. A bill for this purpose (H. R. 3870) "Relating to the public domain certain lands heretofore reserved for a bird reservation in Siskiyou County, California, and Klamath County, Oregon," was introduced on December 14, 1915, and is now in the House Committee on Public Lands. So far as I am aware, the bill has not yet been acted on by the committee.

BREEDING DUCKS FOR SPORT.

One of the first attempts in California to breed ducks for sport has been carried on during the past season. Mr. Charles Shaw established last year on the Briggs Ranch near Newark a miniature game farm. In May, 1916, he received a shipment of 100 black ducks' eggs from Connecticut. These were hatched in incubators and about 85 birds reared to maturity. A number of mallard eggs were also secured from the East and these were also hatched and reared. The experiment apparently proved very successful. Many native birds were attracted to the preserve by those reared, and the facilities for hunting were greatly increased. In addition the grounds were made attractive to ducks by the planting of certain well-known duck foods, imported from the East.

This experiment is of particular interest for two reasons: the introduction of food plants attractive to wild ducks will demonstrate what can be done toward furnishing a better food supply to wild fowl, and the successful rearing of wild ducks for sport will demonstrate whether or not this will prove profitable under our conditions.

For many years past the preserves of Great Britain have reared thousands of wild fowl and used them to augment shooting, but little has been done in this direction in the United States.

GOLDEN BEAVERS TO BE DRIVEN FROM HOMES.

Mandeville Island, situated between Middle and Old rivers, on the lower San Joaquin, will be reclaimed this spring. Mr. Geo Shima, the "potato king," has secured the property and will put it into potatoes. Since this island has long been the home of several colonies of golden beavers (*Castor subauratus*) the fate of these is of particular interest. The first step in this reclamation project will be the draining of the land and burning of the tules and undergrowth. Those beavers which escape the flames will be driven elsewhere. It is natural to expect, therefore, that there will be additional damage to levees due to the building of new burrows and that there will follow a reduction in numbers of this valuable fur-bearer.

This instance emphasizes the often cited fact that in the reclamation of land we have one of the strongest factors tending toward the extermination of wild life. To find a solution for a problem such as this is extremely difficult. A tract of land set aside as a refuge where beaver might breed unmolested appears to offer a practical solution until methods of capture and transportation are considered when such a project immediately appears less feasible. In fact, a study of the problem tends to emphasize the hopeless-

Fig. 31. Sixty ducks (more than a limit) seized from a market hunter at San Diego, California, by Deputy Webb Toms, direct evidence that there are still violators of the limit law.

and of the situation. The dollar looms large alongside of sentiment in favor of protecting wild life. So long as this viewpoint is paramount in the minds of the public the cause of wild life conservation will suffer. When sentiment comes more to the front as it did when the effort was made to save Yosemite Valley and Niagara Falls, even such obstacles as the one outlined above will be overcome.

CHILDREN TAUGHT TO RECOGNIZE BIRDS.

Mr. William Leon Dawson, the well-known bird man of Santa Barbara, has stimulated interest in the bird life of that city by holding a contest open to children in the public schools from the ages of twelve to eighteen. Prizes were offered to the pupil who could identify the largest number of birds in the field. The actual test was made on a field trip upon which certain winners were taken and asked to identify the birds seen. The first prize of $15.00 was awarded Mr. Robert Hyde, who successfully identified 18 birds. The second and third prizes of $7.50 and $2.50 were won by Robert Canterbury and Arthur Wyman.

Similar contests should be held in every city in the State. The interest of children in wild life is fundamental in bringing about proper conservation. It is difficult to convince the game law violator of the error of his ways, but if children are properly trained our wild life in the future will be conserved without the necessity of numerous and drastic game laws.

WHO IS RESPONSIBLE?

A correspondent suggests that, although the decrease in quail and grouse is usually attributed to sheep, that the tourist's gun is the most deadly enemy of these birds. We wonder whether he is not perhaps on the right track. Is it not quite possible that the gunner is attempting to shift a responsibility which really rests upon himself?

Fig. 32. Forty-eight robins, one red-shafted flicker and one California towhee confiscated from two Italian hunters.

CEMETERIES AS BIRD SANCTUARIES.

The National Association of Audubon Societies is actively pushing the project of making bird sanctuaries of all the cemeteries in the United States. Should this campaign be completely successful, more than a million acres would be added to the total area on which bird life is protected.

It is interesting to note that one of the first laws protecting song-birds in California set aside public cemeteries or burying grounds as game refuges, prohibiting the destruction of both birds and nests and eggs. This law was enacted in 1872.

GAME WARDENS AND AUTOMOBILES.

Under a new ruling by the State Board of Control deputies of the Fish and Game Commission who own automobiles are to receive a flat rate of 4½ cents per mile while the automobiles are being used in the service of the State. Heretofore deputies have been reimbursed for gasoline and minor repairs. The State recognizes the increased efficiency of the deputy who uses an automobile and this new ruling, although perhaps not as liberal as it should be, is a step in the right direction.

Fig. 33. Twenty-eight western robins "spitted" ready for roasting, confiscated from two Italians in Sacramento.

DOMESTICATING MINKS.

One of the first American fur-bearers to be tested as to its fitness for domestication was the mink, an animal which has long been renowned for the beauty and durability of its fur. It is found wild throughout Canada, Alaska, and all but the arid southwestern portion of the United States. The mink has been bred in confinement, sporadically, for upward of fifty years; but only recently, since it has become quite scarce in the wild state and the value of its pelt correspondingly increased, has a general and systematic attempt been made to add it to our stock of domestic animals.

Inclosures for minks include runways, which need not exceed 16 or 20 square feet in area, and dens, which afford sleeping quarters and shelter. The runways are variously constructed, and may be of 1 inch mesh, no. 14 wire, of galvanized poultry netting, of galvanized sheet iron or of smooth boards set on end. When netting is used, it covers top, bottom, and sides. Board or sheet iron walls extend 2 feet into the ground and turn inward a foot at the bottom. Covered runways need not be more than a foot high. Those open at the top are built 4 feet higher than the maximum fall of snow.

Dens are usually built of boards and set a little above the ground to keep them free from moisture. They are about 3 feet long, 1 foot wide, and 1 foot high at the eaves, the roof being sloping and covered with water-proof material. Each box has a cross partition a foot from one end, making a small compartment for the nest, and a large one for an entry, shelter, and feeding place. The entrance, at the end opposite the nest, is 4 inches in diameter and has a slide door by which the tenant may be shut in or out. The roof or lid is hinged at the higher edge, and there is a removable screen just below it to prevent escape when the lid is raised. Leaves, dry grass, or straw are used for bedding.—*U. S. Dept. of Agric. Weekly News Letter*, February 16, 1916.

1915-16 DUCK SEASON POOREST IN YEARS.

Deputy W. H. Armstrong, of Vallejo, reports as follows: "I have hunted and shot ducks on the marshes and sloughs of this district since I was twelve years old, but am convinced that the duck season which closes in a few days, has been the poorest season I have ever seen." Everyone in northern California seems to be unanimous in the belief that the last duck season was far below normal. The explanation generally given is that the unusual weather caused the birds to go farther south and hence fewer remained in northern and central California. We have no exact evidence in this regard, except that southern California had good shooting. Thus it would appear that this may have been simply an "off season" and that birds are not in reality as few in numbers as indicated by the birds present during the open season.

Although this year's shooting has been poor, the abundant rainfall during this past winter is sure to cause many ducks, which as a rule leave the State during the spring migration, to remain here and breed.

THE EFFECT OF THE WAR ON BIRDS.

Such reports as have been received thus far indicate that the war will have comparatively little effect on birds. A few storks, owls, swallows, and other birds that nest about buildings, having found the accustomed home destroyed, have sought other quarters; and game birds in France have displayed an unnatural tameness, owing to omission of the usual hunting; but a vast majority of wild birds have followed their ordinary habits, regardless of changed conditions. Woods daily riddled with bullets resound with the songs of nightingales, thrushes, and blackbirds; after fierce night engagements, in which artillery and infantry have taken heavy toll of human life, at dawn the usual peaceful chorus has been heard floating over the corpse-strewn battlefield; pheasants and partridges have been seen strutting unconcernedly about an orchard situated directly between the opposing lines and often swept by rifle and artillery fire; and the song of a soaring skylark has been heard in a moment's cessation of the thunder of cannonading. As fearful as the war seems to us, to the birds it brings no greater cause for anxiety and terror than the constant war they endure at the hands of man in our times of peace. Rather have they shown less fear than ordinarily, nesting in trenches among the soldiers and even feeding from the hands of their late enemies.

Many instances have been reported of birds giving warning of the approach of zeppelins or aeroplanes; soldiers have been awakened and informed of a coming attack of poisonous gas by the noise of birds which have detected the fumes; and once, in the North Sea, the presence of a submarine was disclosed by the clustering of gulls around the periscope. Parrots have displayed special susceptibility, showing great excitement and screaming loudly before the attacking aeroplanes were discernible by human vision, and a number of these birds are said to have been placed on the Eiffel Tower, in Paris, to ascertain how useful they may be in announcing the approach of hostile aircraft.—*Current Items of Interest*, November 15, 1915.

HUNTING ACCIDENTS.

A partial list of the accidents incident to the last open season is appended herewith. In almost every instance where death followed, a man was mistaken for a deer. Evidently the "look before you shoot" motto is still disregarded by many hunters, for since our law allows only the killing of deer with well-developed horns, there is no excuse for the man who makes a mistake as to his mark.

A perusal of this list does not bring out as it should the tragedy and heartache which followed the carelessness of the hunter. Nevertheless, it is hoped that it will suffice to bring to the mind of every reader the conviction that unless greater care is exercised in the use of firearms, there will be a need for the institution of shooting laws more largely as a protection for man than as a protection for game itself.

KILLED

Name	*Shot by*	*Date*	*Locality*	*How shot*
Dr. J. F. Richards	Companion	----------	Contra Costa Co.	Hunting quail
John England	M. J. Kennedy	August, 1915	Annapolis, Sonoma Co.	Mistaken for deer
James Hoover	W. C. Hoover (brother)	August 22, 1915	Beswick, Siskiyou Co.	Mistaken for deer
Ellis Dawson	Will George (brother-in-law)	August 24, 1915	Cecilville, Siskiyou Co.	Mistaken for bear
Frank Adams	Jack Stambo	November 28, 1915	Eagleville, Modoc Co.	Mistaken for hawk
Albert S. Bacon	Theodore Haskonson	October, 1915	Bee Gum, Tehama Co.	Mistaken for deer
John Crank, Jr.	Two hunting companions	October 11, 1915	Weaverville, Trinity Co.	Mistaken for deer
Wm. Dornan	Alexander Scapprizzi	August 29, 1915	Electra, Calaveras Co.	Mistaken for deer

WOUNDED

Drury J. Edds	Party of four hunters	August 23, 1915	Baird, Shasta Co.	Mistaken for bear
Mr. Collins	Companion	October, 1915	Elsinore, Riverside Co.	Shot in eye while quail hunting
A. L. Porter	Uede Jacobs	November 19, 1915	Elsinore, Riverside Co.	Shot in eye while quail hunting
Theo. Gutman	Fred Schneider	September 9, 1915	Elsinore, Riverside Co.	Shot in eye while rabbit hunting
Chas. Dundas	R. C. Pridge	October 25, 1915	Elsinore, Riverside Co.	Shot in eye while quail hunting
Vincent Gregory	----------	November 15, 1915	Elsinore, Riverside Co.	Shot in arm while duck hunting
Percy Lee	G. E. Marshall	August 15, 1915	Placerville, El Dorado Co.	Mistaken for deer
W. C. Jarete	Herbert Taylor	August 15, 1915	Stockton, San Joaquin Co.	Hunting deer
W. Y. Stoddard	Paul Sprague	October 16, 1915	Quincy, Plumas Co.	Hunting ducks

SHOT BY ACCIDENTALLY DISCHARGED GUN.

Name	*Locality*	*How shot*
Albert Richardson	Placerville, El Dorado Co.	Shot in left hand by accidental discharge of gun held by Frank Daily while deer hunting
Joseph Costa	Benicia, Solano Co.	Shot in leg by gun held by brother, discharged when crawling through fence
Antone Crava	Rio Vista, Solano Co.	Shot through heart by accidentally discharged gun being removed from boat
Jos. Cantria	Encinitas, San Diego Co.	Shot while pulling gun through fence
Roy Flag	El Cajon, San Diego Co.	
Amos Decker	National City, San Diego Co.	Shot while pulling gun through fence
Jess Bushnell	Monterey, Monterey Co.	Tripped over gun while duck hunting

REAPPEARANCE OF QUAIL DISEASE.

Owing to the prevalence of quail disease among quail imported from Mexico at the ports of New York and Eagle Pass, Texas, during the past month, the Department of Agriculture has suspended issue of further permits for entry of these birds this season. Quail in shipments actually en route to the United States on January 20, will be admitted to quarantine, but no further entries will be authorized. Most of the states now have such stringent game laws that it is practically impossible to purchase quail even for propagating purposes in the United States and dealers have sought quail elsewhere, especially in northeastern Mexico, where quail occur in abundance, but Mexican quail on arrival at destination are frequently found infected with quail disease. So fatal is this disease that when it once appears most of the birds which are exposed to it die within a few days. In one shipment of 196 quail which recently reached New York only three birds survived the voyage, and in another of about 100 birds, more than two-thirds of the number died shortly after arrival. More than one-third of all the Mexican quail imported last year died within a few months. To guard against spread of quail disease live quail purchased for propagation should be kept under observation for two or three weeks and should not be liberated if infected with disease. The Department desires to ascertain the result of experiments which have been made in importing quail this year and will be glad to receive information as to the condition of the birds and as to how many have died in any locality where the quail have been introduced.

Before next season the Department will hold a public hearing in Washington, D. C., for the purpose of determining whether or not further permits for importation of quail from Mexico will be issued, at which various questions connected with the importation of quail will be carefully considered. Ample notice of this hearing will be given later in order that those who are interested may arrange to be present or to submit written statements.

A MIXED RATION FOR PHEASANTS.

Two ring-necked pheasants (a cock and a hen) confined in a pen 8' x 16' x 6' and rat-proof, sides and top of 1" mesh galvanized wire, were recently tested as to their food preference. Food was accessible to them at all times but in separate hoppers, which were covered with wire to prevent waste. All food materials were carefully weighed on a kitchen scale. My purpose in making the test was to establish the food preference of the birds.

For convenience of comparison I have tabulated the results as follows:

	Ounces	Per cent
Cracked wheat	36	20
Cracked corn	41.4	23
Rolled oats	12.6	7
Rape seed	21.6	12
Millet seed	14.4	8
Canary seed	12.6	7
Ground dried meat	34.2	19
Granulated charcoal	1.8	1
Grit	1.8	1
Ground bone	1.8	1
Calcined shell	1.8	1
	180.0	100

In addition, the birds were supplied with a head of fresh lettuce per day, of which they consumed from one-half to three-quarters. It will be seen that the food taken averaged 2½ ounces each per day.

At the commencement of the test the cock weighed 1 pound 14 ounces and the hen 1 pound 8 ounces; at the end of thirty days, when the test was completed, the cock weighed 2 pounds 4 ounces, a gain of 8 ounces, whereas the hen weighed 1 pound 12 ounces, or a gain of 4 ounces. This gain in weight indicated that these pheasants had thrived upon the mixed food afforded them.—JOSEPH KETCHUM.

1917 NATIONAL SPORTSMEN'S SHOW.

The National Sportsmen's Show Corporation of No. 1 Madison Ave., New York City, will hold the next annual Sportsmen's Show under the auspices of the National Sportsmen's Association, Inc., in February, 1917, in New York City. A strong array of exhibitors is already lined up and includes a number of new comers in the field, besides some of the old stagers who exhibited in the earlier shows but fell out of line and now have volunteered to enlist again in the ranks. As it is obvious that there are probably now at least one hundred sportsmen and outers in North America where there was one in 1895, when Captain J. A. H. Dressel put on and managed the first Sportsmen's Show in the Madison Square Garden, the belief is warranted that the shows of the future

can be greater and meet with a fuller response than those successfully managed by Captain Drexel from 1895 to 1910, inclusive.

The next and future Sportsmen's Shows will be managed by Captain Drexel and Mr. Allen S. Williams. While there is to be novelty in the treatment of the great theme of outdoor life, the purpose will be maintained to revive the old Sportsmen's Show as it was in its palmiest days and make it as much better as experience and advanced ideas can make it. The central feature will be a lake, picturesque with Indians in canoes, and affording an ideal means for exhibiting on and around it stock motor boats, which find their logical users among the hunters and anglers. While many game regions will be represented, Canada, especially New Brunswick, and secondly Maine, will be so extensively featured in the next Sportsmen's Show that if the desire for space of railways, camp owners and guides could be satisfied the show could rest upon these territories alone.

An effort was made by the association and corporation to hold a show in March of this year at Madison Square Garden, but owing to interferences which precluded a sufficiently early beginning and the fact that about every exhibition held this season, with the sole exception of the Automobile Show, proved total or partial failures, it was decided that to wait until 1917 would be a policy of wisdom for all interests.

FEEDING HOUSES FOR DEER AND QUAIL.

J. W. Jamison, of Dutch Flat, California, offers the following suggestions for properly caring for deer during the winter season:

"Throughout the Sierras there are very low places along rivers which deer make every effort to reach. It is at such points that feeding stations should be erected. They should consist of two-story sheds with racks in lower part filled with alfalfa. Hay and wheat should be dropped from the upper story through an hourglass perhaps once a day on to a fan-shaped table which would scatter the wheat for the quail. I think these feeding houses could be built for about $400 each. It would be necessary to make a mile each side of these stations a reserve so that no one could shoot around the place. The reserve should be wired off so that cattle could not get to the hay.

"It is safe to say that during our heavy winter of 1889–90, 2,000 or 3,000 deer perished in the Sierras. If we could have had these feeding stations I feel that at least one-half the number could have been saved."

HATCHERY AND FISHERY NOTES.

THE PEOPLE TO BLAME FOR THE HIGH COST OF FISH.

In this issue of CALIFORNIA FISH AND GAME, the Commission begins a series of articles on the commercial fisheries of the State. The object of the series is to arouse the public to a greater interest in our fisheries and induce them to make better use of some of the excellent fish which are now little used. With these articles we will print recipes for cooking the different fish under discussion, along with notes of interest on their habits, seasons, etc. These recipes will later be gathered together in one book. This is in line with work that has been done by the United States Bureau of Fisheries which resulted in the publication of economic circulars on oysters, salmon and tile fish.

The shad has been first selected, for the reason that it will be running in great numbers when this magazine is issued and those who may become interested enough to try a shad for the first time may be able to procure them at any market and at a comparatively low cost. During the months of April, May, and June, they can be secured in the retail markets for six cents or less per pound, while with them will be salmon, striped bass, and halibut selling for fifteen to twenty cents per pound. Besides these reasons, the shad is as good a fish as these higher-priced varieties and, more than any other fish in the State, deserves a higher place in our esteem.

Our fisheries, particularly those of the ocean, are little developed and will stand a much greater strain than has yet been placed upon them. There are some very good fish in myriads which we have not even begun to use. Comparatively few

fish are eaten in the State, for we have never acquired the fish-eating habit. We have much to learn from the Norwegians, Swedes, Germans, French, Italians and Japanese in this respect. Most of us do not know how to prepare and cook fish and know even less about the names and seasons and the comparative food values of the different species displayed in the markets. Eighty-five per cent of the fish eaten are marketed on Friday. If we would only learn to eat fish any day of the week, or at least have two fish days a week, we could buy fish cheaper. Fishermen fish every day in the week except Saturday, and fish in the market are as fresh on one day as another. Confining the eating of fish to one day a week prevents any great increase in consumption. This, coupled with the great expense of running a market that for six days of the week does little business, keeps the price of fish up. The fault lies mostly with the people and not so much with those who market the fish. It has been the custom to lay the blame for the high cost of fish on the wholesale fish dealer, but this is unjust, for there is at the present time an active competition between these dealers and they are wholesaling their fish at a reasonable figure. Our laws permit fish to be brought in from other states and from Mexico, which in itself would keep down the wholesale price.

We believe that the blame for the light consumption of fish lies mostly with the people and that an awakened interest in fish, coupled with an added consumption, will reduce the cost and that many excellent varieties now wasted will find their way to the people at a reasonable price.

NEW QUARTERS FOR DEPARTMENT OF FISH CULTURE.

On March 1 the office of the Department of Fish Culture of the California Fish and Game Commission, was transferred from Sisson to San Francisco. W. H. Shebley, who for the past twenty-one years has been superintendent of the Sisson Fish Hatchery, and has for the past five years been in charge of all the hatcheries in the State, has been placed in charge of the new department. Mr. Shebley will have offices in the new Call Building. The fish cultural operations of the California Fish and Game Commission have greatly increased within the past two years. With the opening of new stations in the central and southern parts of the State, it has been found advisable to transfer the head office of the department to a more centrally located section. E. W. Hunt, who was recently appointed special field agent of the Department of Fish Culture, and J. H. Hoerl, chief clerk of the Department of Fish Culture, have also been transferred to San Francisco. Mr. Shebley is succeeded as superintendent of the Sisson hatchery by Captain G. H. Lamlson, who for the past seventeen years has been superintendent of the United States Bureau of Fisheries stations in California.

HATCHERIES IN FULL OPERATION.

There are approximately 18,000,000 quinnat salmon fry at Sisson hatchery at the present time. The Commission is planning to hold and feed from 12,000,000 to 15,000,000 of these salmon fry at Sisson hatchery and at the proper time distribute them in the Sacramento and Klamath rivers. Approximately 4,000,000 Loch Leven and Eastern brook trout eggs are being hatched out at this hatchery for distribution in the streams of the State during the coming summer. The rainbow trout egg collection stations on the Klamath River have been opened up, and everything is now in readiness for the egg collecting operations. On account of the very severe storms, the water in the Klamath River and tributaries is very high. The streams are flowing bank full and the water is very roily. Under these conditions the spawning fish will not enter the tributary streams where our racks and traps are located. Every effort is being made to collect a large number of rainbow trout eggs this season, and if weather conditions are favorable from now on there is still a chance that a fair take of eggs may be secured. In addition to the spawning stations on the Klamath River, the board is contemplating opening up the egg collecting station at Burney Creek during the coming month.

The steelhead egg collecting stations at Snow Mountain dam, Mendocino County, and Scott Creek, Santa Cruz County, were opened up during January and February. To date about 500,000 steelhead trout eggs have been taken at Snow Mountain and there are 570,000 eggs on hand

at the Brookdale hatchery from Scott Creek Station.

The Ukiah hatchery was opened up last December and there are 750,000 quinnat salmon fry now ready for distribution. The fry will be distributed in Eel River and tributaries and in Mad River, Humboldt County.

The old Price Creek hatchery, located near Grizzly Bluff, Humboldt County, is being removed to a site on Fort Seward Creek, a tributary of the Eel River, on the line of the Northwestern Pacific Railroad. A modern hatchery will be erected on the new site. With the improved water supply system and better transportation facilities, the Commission will be enabled to do far better work in keeping the streams of the northwest coast stocked with fish. Both quinnat salmon and trout will be propagated at the new hatchery. It is expected that the hatchery will be ready for operation by April 15.

About 50,000 Eastern brook trout fry are being held at the Verdi hatchery for distribution in the streams and lakes of the Tahoe region during the coming season. An additional 50,000 fish of the same species are being held at this hatchery for planting in Marlett Lake, to keep up the supply of breeders.

The plans for the large hatchery to be located on Oak Creek in Inyo County, were approved by the Board of Fish and Game Commissioners at a meeting held March 10 (see Fig. 34). Work on the structure will be commenced at once. The building will be constructed of granite boulders and when completed will have all the latest and most improved apparatus used in modern fisheculture. This fine hatchery, designed for the purpose of supplying the streams of southern California and the district as far north as Fresno, as well as the streams and lakes of Inyo, Mono, and Alpine counties, is the result of the untiring efforts of Commissioner M. J. Connell to establish a hatchery that will supply the wants of the people of the district mentioned above for a quarter of a century. The people of the State of California should be proud of what will be the finest hatchery in the world.

Fig. 34. Site of new Inyo Fish Hatchery, Independence, California. Cross marks exact location. Photograph by R. D. Duke.

FISHWAYS TO BE INSTALLED.

During the past month fishway plans have been made for changes in the Hihn Company dam on Zyante Creek, the Well's dam on San Gregorio Creek, and the California Western Railway and Navigation Company's dam in Putting Creek, Mendocino County. On account of the high water in the streams it has been impossible to do much in the way of constructing fish ladders, but plans are under way to rush the work as soon as the spring freshets have subsided.

SCREENS IN IRRIGATION DITCHES.

Some idea of the importance of screens in irrigation ditches is to be had from the following, reported by an assistant of the

Fish and Game Commission: One haul of a seine through 150 feet of an unscreened canal in Fresno County yielded 1,362 black bass. Black bass are an introduced fish in California and they have become numerous in many parts of the State. In the eastern states large sums are expended in the artificial propagation of black bass, but they have never needed that kind of assistance here, and they are not likely to if they can be kept out of irrigation ditches.

NEW FISH PRODUCTS.

Mr. O. A. Nelson, who for a few months has been manufacturing an excellent fish-food product in San Francisco under the name of C-King Fishbolles, has consolidated with the Western California Fish Company of San Francisco. With an enlarged plant he will continue to put up the Fishbolles under the C-King brand and will still do business under the name of Nelson Sea Products Company. He will put up in convenient sized cans, cut, spiced, marinated, bismarked and roll mop herrings. These products have never been put up in cans in this State before. Local fish will be mostly used for the purpose. The company will also put up Christiania anchovies. Another product will be sturgeon caviar, and they expect in time to make caviar of shad and salmon roe. One of their best products will be smoked sliced salmon in oil, for which a good market is developing in this country. Hitherto smoked salmon in cans has been put up only in one place on the Pacific Coast—Astoria, Oregon.

COMMERCIAL FISHERMEN OF CALIFORNIA.

During the fiscal year ending March 31, 1916, there were 3,758 commercial fishing licenses sold in the State. The different fishermen who procured licenses have given on their applications their places of birth as follows: Italy, 1,310; United States, 1,094; Japan, 491; Greece, 184; Portugal, 152; Russia, 82; Austria, 67; Germany, 58; Sweden, 54; China, 46; Norway, 44; Denmark, 41; Spain, 19; England, 17; Canada, 13; Turkey, 12; Ireland, 10; Scotland, 1; miscellaneous, 63.

Fig. 35 Klamath River bar fishermen, Requa, Del Norte County, California.

COMMERCIAL FISHERY STATISTICS.

The accompanying table (pages 102-3), will show the amount of fish, crustaceans, and mollusks taken in the waters of California by commercial fishermen for the three months ending December 31, 1915, and utilized both in the fresh markets and by packers. This information is made available through the reports submitted

by the fish dealers of the State to the Fish and Game Commission. The figures show under the names of counties the amounts in pounds, unless otherwise stated, of the various species of fish received. This is the first report of the kind ever published on the fisheries of California, and the Commission believes that it will be of considerable value both to the general public and to those commercially interested in fisheries.

A table showing the fishery statistics by counties will be published quarterly in

fish received in small have been grouped together.

It should be noted also that the report does not always indicate the county in which the fish were caught, but rather the county in which they were received for consumption. These coincide in but few instances. Of the fish received at San Francisco, for instance, there is a very small percentage taken in San Francisco County, most of it coming from San Mateo, Alameda, Contra Costa, Solano, Sonoma, Marin, and Mendocino counties.

Fig. 36. A catch of trout in Manzanita Lake, near Red Bluff, Tehama County. The season for trout opens May 1, 1916.

CALIFORNIA FISH AND GAME, along with other information concerning the commercial fisheries. The Commission is now making a complete canvass of the commercial fisheries of the State, and a report of these operations will be published by the end of the year.

While we believe the following table to be fairly accurate and to show practically all the fish received by the various dealers, certain items are not accounted for; as, for instance, fish handled by peddlers and by some fishermen who have sold direct to consumers. Likewise, fish taken by individuals for their own consumption or by anglers are of course not included. Those counties in which the amount of

On the other hand, the figures shown for Del Norte and Humboldt counties indicate fish taken almost wholly within the boundaries of these counties. In the San Francisco Bay region the greatest area of fishing ground lies within the boundaries of Solano County. While large quantities of fish caught in Solano County are taken directly to San Francisco and credited to San Francisco County, the greater part is shipped from various points in Contra Costa County and is credited to that county. Then farther up the river in the delta country of Sacramento, San Joaquin, Solano, and Yolo counties, the fish are collected from the fishermen by the fish buyers' boats and

shipped from the place which happens to be their headquarters. The fish at Santa Cruz practically all come from Santa Cruz and San Mateo County waters, whereas the fish received at Monterey practically all come from waters lying within the boundaries of Monterey County. San Luis Obispo, Santa Barbara, and Ventura counties do not show very large receipts, for most of the fish taken along the coast of these counties and around the Santa Barbara Islands is taken to San Pedro and other points in Los Angeles County and is consequently credited to that county. Practically all the fish shown in the column under Orange County are taken in that county. Fish received at San Diego are taken largely in San Diego waters and off the coast of Mexico. The fish taken in Mexican waters are caught principally by fishermen from San Diego.

CRUSTACEANS.

Crabs are taken in Monterey Bay, along the coast from Half Moon Bay to Bodega Bay, and along the coast of Humboldt County. The spiny lobster fisheries are located along the coast of southern California from the northern boundary line of Santa Barbara County south to Mexico, including the adjacent islands. Practically all the shrimps are taken in San Francisco. Ereviss are taken in the rivers of Sonoma County.

MOLLUSKS.

San Luis Obispo County furnishes most of the Pismo clams, although considerable quantities are taken on the beaches of Monterey Bay.

The soft shell clams are taken principally in San Francisco Bay and in Tomales Bay, Marin County.

The small quantity of cattle fish used are taken in Monterey, Santa Cruz, and San Francisco fishermen.

The shell oysters are from San Francisco Bay and Tomales Bay. The squid, which are consumed mostly by the Chinese and Japanese, are taken in the vicinity of Monterey Bay. The abalones, while found generally along the rocky portions of the coast, are taken for marketing and canning purposes principally in San Luis Obispo, Monterey, and Santa Cruz counties. Abalones are fairly abundant in several other places along the coast, as for instance Sonoma and Mendocino counties, and there are quite a few shipped from these counties to the San Francisco and Oakland markets.

The large California mussels are taken at various places along the rocky portions of the coast, but are not handled to any great extent by the markets. A smaller variety found in San Francisco Bay is sold in the San Francisco and Oakland markets to some extent.

SHAD SPAWN TO BE FURNISHED EASTERN STATES.

It is interesting now, after forty-five years have elapsed since shad were introduced into California waters, to draw a comparison between our own and the Atlantic shad. The fish in California have increased enormously, while in many of the streams of the Atlantic Coast they have become nearly extinct and the use of nets has in many cases been prohibited. Artificial propagation has never been resorted to here, while on the east coast the hatching of shad is the principal activity of the hatcheries. The wholesale price of shad in the New York market at the present time is $1.65 per fish, which is more than five times the retail price here. This is not because the shad is a better fish on the Atlantic Coast, for our shad is in every respect as good. In fact, the wholesale price of all varieties of fish on the Atlantic Coast is much higher than of dressed fish sold in the retail markets here. It is proposed during the present run of shad to ship shad spawn to the Atlantic Coast for hatching purposes in the hope of again building up the run in the depleted rivers. The fish and game commissions of Massachusetts and Connecticut are making preparations to restock in this manner the Connecticut River. The eggs will be taken on the San Joaquin River in the neighborhood of Stockton, and after fertilization the development of the eggs will be retarded by refrigeration while they are en route to the Connecticut River. The eggs ordinarily hatch in about four days, but it is believed the hatching period can be prolonged by this method so that they may be successfully transported and the hatching completed after arrival on the east coast. Turn about is fair play. The East furnished us with shad; now we have a chance to reciprocate.

TABLE SHOWING AMOUNT OF FISH, CRUSTACEANS, AND MOLLUSKS TAKEN IN CALIFORNIA WATERS FOR THREE MONTHS ENDING DECEMBER 31, 1915.

Species of Fish	[illegible]	[illegible]	Monterey	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Albacore								
Anchovy								
Barracuda								
Bonita								
Boccaccio								
Bluefish								
Chilipepper								
Carp					267	11,743	12,217	
Catfish		5,261			24,479	65,994	3,459	
Codfish								
Cultus cod				40				25,480
Dogfish								
Flounder	125			50	251		250	97,200
Halibut (California)	1,462							1,150
Hake								73,462
Herring		2,650	15,720					1,400
Kingfish								14,140
Mackerel								
Mullet								
Pike (California)						195	4,620	
Pompano								
Perch	1,250		15,462					1,100
Rock bass								
Rock fish (miscellaneous)	1,587		1,200					201,300
Sole	50							1,245,200
Salmon	713,222	5,637	1,015	27,000	13,250	11,014	467	
Smelt	1,612		2,715					6,000
Sea bass (white)	53		4,000					3,120
Sea bass (black)								
Sand dab								497,400
Striped bass		700	2,462	30,195	3,620	105,151	15,000	
Shad			431	9,362		31,340	700	
Sturgeon						1,250		
Sardine								
Skate							28,700	
Sculpin								
Sea trout								
Tom cod						200	6,000	
Trout (lake)								
Trout (steelhead)	32,200							
Turbot			800					
Whitebait (fry)			1,647				2,300	
Yellow tail								
Miscellaneous					3,757	2,247	14,496	
Total fish	761,204	14,285	144,476	117,986	97,119	169,043	2,380,371	
Crustaceans—								
Crabs, dozen	537	156½					19,961	
Spiny lobster								
Shrimp							64,000	
Ecrevisse		160						
Mollusks—								
Squid								
Cuttlefish							718	
Clams, Pismo								
Clams, cockle			3,000					
Clams, softshell		5,374	50,000			100,072		
Clams, mixed	200		95					
Oysters (shell), number			5,415					2,943,650
Abalones		96						
Mussels		40					12,500	

TABLE SHOWING AMOUNT OF FISH, CRUSTACEANS, AND MOLLUSKS TAKEN IN CALIFORNIA WATERS FOR THREE MONTHS ENDING DECEMBER 31, 1915.

Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
			1,414,327		14,534			1,428,856
	10,944							10,944
5,400	11,600	31,000	197,225	500	73,726		270,840	610,245
	63,770	11,000	286,500		18,966			364,236
	1,150							1,150
	700		1,350					2,048
500	37,447							37,966
			810					26,135
								56,907
	740							740
25,000	44,000							196,025
			140					140
76,000			3,917					176,708
1,487	400	200	61,310	128	905,927		548,100	1,913,398
6,717		3,400	3,000					47,437
			1,000					104,302
26,000	27,000		52,227	80	200			151,992
715	27,000	9,000	142,019	7,313	18,646			215,780
			6	16		568		590
								4,808
			1,491					1,491
	270	410	32,365	301				51,566
			75,307	5,311	12,776			96,639
77,000	202,141	8,120	591,469	16,017	511,394			1,387,425
200,000	5,710		2,244		2,000			1,416,519
148	702							773,406
2,429	20,218	12,568	50,534	129,000	27,380			281,440
60,000	25,000	6,000	47,005		600		32,500	208,909
			2,120		35,546			37,679
60,770	1,710		5,461	347				551,784
			30					176,488
								38,728
								1,296
1,200	2,047,200		9,210		675			3,058,664
200			22	54				34,076
			2,000	20				2,119
			7	500				566
								6,900
						100		192
								33,238
								800
	100				220			5,320
	40		200,000	600	141,700			400,240
126,000			17,170		105			176,576
772,594	2,570,250	140,102	4,013,101	160,808	1,400,570	700	1,151,446	14,160,572
102	2,027							23,674
		20,000	180,000	65,707	110,000		23,578	445,000
								64,000
								160
	60,700		100					300,000
	400							1,200
2,000		71,000						24,000
								2,007
								102,446
			2,000	707				2,000
	100							2,000,000
17,000	307,700	22,700	3,701	102			102,001	474,000
			12,000		120			26,000

TRY SHAD AS A FOOD FISH.

Much of the blame for the little use made of fish is laid to the housewife. She usually knows little about preparing or cooking fish, and admits it. It is charged, and it appears to be true, that she will choose halibut, salmon or striped bass at 20 cents per pound, and will pass by the shad, rock cod, and other fish at 6 and 8 cents per pound, because the latter are not so easy to prepare and cook. But the man of the house should do his part and learn to be an expert carver so that he may serve fish without its looking like hash. Incidentally, he will probably find his wife does not have the proper tools to work with, that he never sharpens her knives, and that she does not even have proper sharpening apparatus and has to resort to the stove pipe. For this he should take the blame.

Let him pick out a nice shad and then try the different stunts suggested in this issue. If you have not tried shad and do not know much about fish, start out by getting the shad already split at the fish market. If, as it may happen, the fish market man does not know how, show him the directions and figures below, and he will find he can increase his sales by displaying the nicely split halves of the shad and incidentally increase the use of this very excellent, though little used fish.

PREPARATION OF FILLET OF SHAD.

To prepare fillet of shad: Scale the fish, then dress as usual by slitting along the belly. Then, as in figure 37, split the flesh from the right side of the fish by starting at the tail with the back of the fish to the right and cutting close to the backbone, leaving the fin and bones along the middle line of back with the under half. Continue the cut on through the head.

Next sever the backbone near the tail; insert the knife underneath the severed end and split the backbone away from the fish, taking with it the back fin and bones near it; then split away the remaining portion of the backbone, taking the tail fin with it (see Fig 38*a*).*

With the cut surface of one side uppermost, start at the head and shave away

Fig. 37. The preparation of fillet of shad. Splitting the shad.

the rib bones along the inside of the belly (Fig. 38*b*). Repeat this operation with the other half and the two halves are ready for cooking as in Fig. 38*c*. The free bones left in the flesh are in a row and easily removed while eating, or, if desired, can be removed before serving. It is considered good taste to pull these bones out with the fingers and to eat the meat attached. To facilitate this method a thin or butter sauce is served on the fish. It will be seen that it is a little more trouble to prepare a shad in this way than it is to prepare a striped bass or a salmon, but the fine flavor and delicate meat of the fish repays one for the entire trouble and, what is more to the point, the shad can be purchased for one-third the cost.

*The illustrations for preparing fillet of shad were kindly posed by Mr. Jack Mensinal, manager of the California Fish Company.

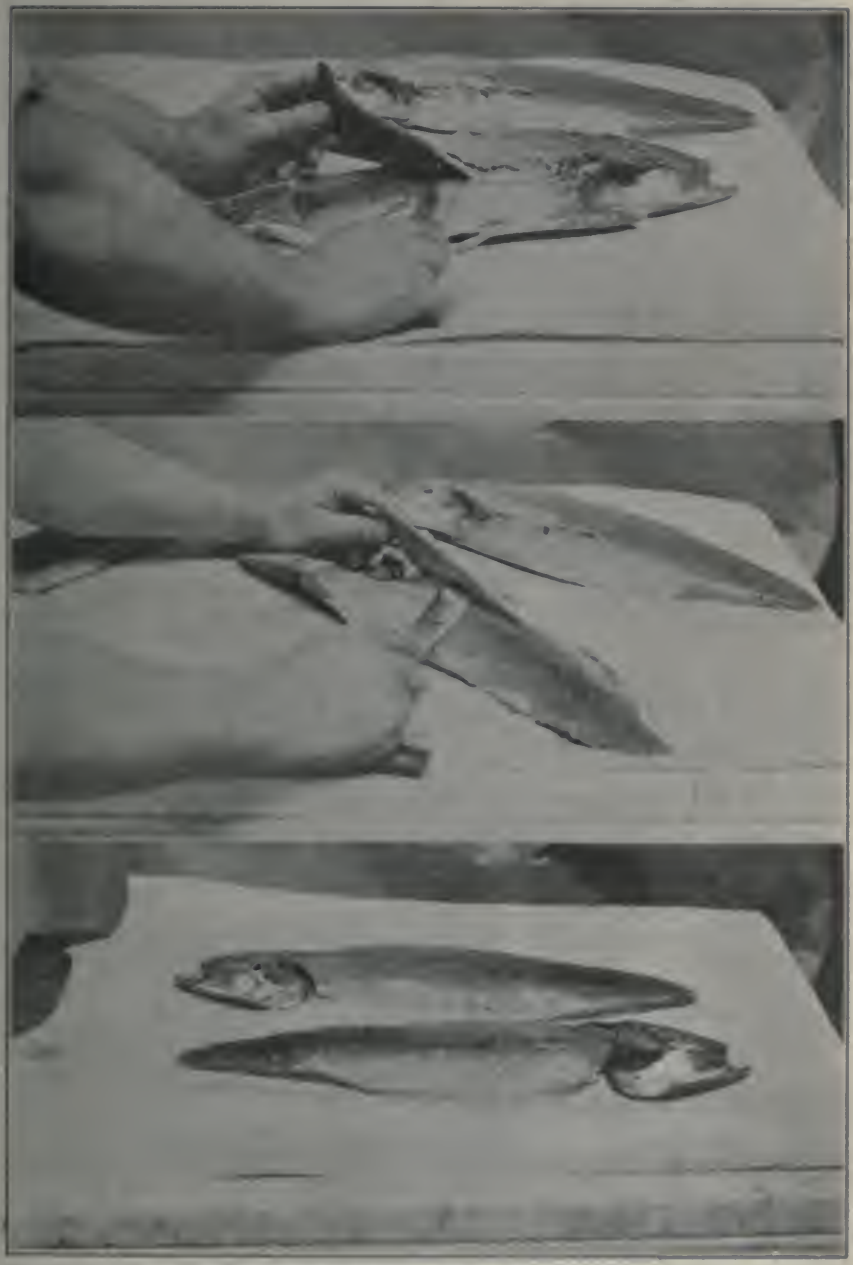

Fig. 38. Successive stages in preparing fillet of shad.

THE REMOVAL OF BONES FROM COOKED SHAD.

To remove the bones after shad is baked or boiled as a whole fish: The secret of success with this method is a very sharp knife. With the back of the fish to you and the head to the right, sever the flesh of the left side from the backbone and back fin much as was done in preparing fillet of shad, except that the meat is cut away from the head. Insert the knife lengthwise into the slit thus made and carefully lift the severed side up and then turn it over and off of the rest of the fish without breaking, care being taken that the bones are left with the lower side. Turn the remaining side of the fish with the bone side down, and with the sharp knife cut between the flesh and the back bone so as to leave the fin of the back with the bones. Then lift this side over as was done with the other, being careful that the bones hold together and are left on the platter. The large rib bones can be removed from the inside of the belly with the point of the knife or the prong of a fork. Slide the two halves, thus freed of the bones, on to a clean platter. If desired, the remaining flesh bones can be taken out by opening the muscle layers along the line of these bones and removing. We are told by those who have used this method that with care and a little experience a person can serve a shad without a single bone. Half the pleasure in eating fish is to have it nicely served, so care should be taken to get the fillets on the platter with the flesh unbroken. Pour the fish sauce (butter sauce) over the fillets and garnish with sprays of parsley and quartered lemon. The ordinary way of cutting the baked or boiled fish into chunks, if employed with the shad, leaves the meat in a chewed-up condition and hopelessly mixed with fine and large bones.

To boil a fish, especially a shad which you wish to keep unbroken so as to remove the bones, it is best to wrap it first in cheese, or butter cloth and tie at each end. It can then be lifted out easily by the two ends after cooking without breaking.

SHAD RECIPES.

The following word of appreciation for the shad with recommended ways of cooking is from Victor Hirtzler, chef of Hotel St. Francis, San Francisco:

The shad is one of the best fishes we have in California and I can not recommend it highly enough. To get the bones out of the shad, split the fish and you will find that the small bones will hang to the larger and come away with the backbone if it is carefully removed. Take a thin knife and shave off the rib bones from the inside of the belly and you will then have all the large bones out of the fish. The other small bones will melt away while cooking. This fish is not appreciated enough on this coast and I can only say that the meat is delicious and easy to prepare in many ways.

Broiled Shad Maitre D'Hôtel.

Split shad and take out bones as given above and season with salt and pepper; roll in a little olive oil and broil. When done, place on a platter and put some maitre d'hôtel butter over it. Garnish with parsley in branches and quartered lemon.

Maitre d'hotel butter, as follows: Four ounces of butter; season with salt, pepper, little nutmeg, chopped parsley, the juice of a lemon, and mix well.

Shad Meuniere.

Split, season with salt and pepper; roll in a little cream, then flour. Put in frying pan with piece of butter and when done place on a platter. Add to the pan another piece of butter and when brown pour over fish, then sprinkle with chopped parsley and thin slice of a lemon. Garnish with parsley and quartered lemon.

Sweet and Sour Shad.

(For one shad split.)

Soak one-half pound of spiced cake (called fish cake) unsweetened, which can be obtained in any fancy grocery store, in one glass of vinegar; then add one-half pound of brown sugar; mix well like a mush.

Boil the head and bones in a quart of water, one-half onion, one-half carrot, one bay leaf and two cloves, little parsley, for one-half hour.

Place your fish in pan, season with salt and pepper, pour the above broths over and let cook slowly for twenty minutes; then place the fish on a platter.

Take broth from fish and cook with the cake mush for ten minutes, strain and put back on fire; add one-half pound seedless raisins, bring to a boil and pour over the fish on platter, let stand for one hour and serve cold or hot—never in between, just temperature of room.

Planked Shad.

Butter plank and lay one shad on it. And put in oven; season with salt and pepper and lay few pieces of butter on top of the

fish. After forty minutes in medium oven fish is cooked; serve potato mashed or in cream with it; garnish the plank with parsley and lemons.

The Hof Bräu of San Francisco recommends the following methods of cooking:

Broiled Shad.

Clean same as other fish. Take roe out and split from the back. Take bones out, then dip your fillet of shad in olive oil, season with pepper and salt. Put on the broiler and cook for about fifteen minutes. Serve à la maitre d'hôtel (butter, lemon juice and chopped parsley), garnish with maitre d'hôtel or Parisian potatoes.

Planked Shad.

Cook same as above and serve broiled shad on a plank with duchess potatoes and maitre d'hôtel with a few strips of bacon.

Duchess potatoes—Mashed potatoes with yolks of eggs, nutmeg, salt and pepper, but no milk.

Fried Shad Meuniere.

Dip the fillet of shad in milk, season with salt and pepper. Then dip in flour and fry in a pan with equal parts of olive oil and butter. When cooked pour some maitre d'hôtel butter over it.

Meuniere butter—Brown butter, not too brown, with lemon juice and chopped parsley. Serve duchess potatoes.

Chef Sorensen of the Portola Louvré, San Francisco, considers the shad as good as any fish we have and gives the following varied methods of cooking:

Planked Shad à la Portola-Louvré.

Cut shad in two, put the side with the roes on a hot plank; put in oven from fifteen to twenty minutes, baste same with a mixture of one tablespoon melted butter, two tablespoons cream, one tablespoon worcestershire sauce, one tablespoon sherry wine. When nearly finished put border of mashed potatoes and garnish with two strips of fried salt pork and bouquet of Julienne potatoes, parsley and lemon.

Medallion of Shad à la Black.

Cut shad in two, then in pieces about two inches square; put in buttered saucepan, sprinkle with chopped onions, mushrooms and a very little garlic, moisten with wineglass full of white wine. Put in hot oven for fifteen minutes; take flour and butter and make sauce of juice, serve with chopped parsley on hot dish.

Shad à la Palestine (for 5 persons).

After the shad is cleaned well, cut in portions the size you intend to serve. Put same in a pot so that it is barely covered with water. Use the head also, as it gives more strength to the gravy. Boil slowly. When about half done add following seasoning: Eight whole peppers, small piece of cinnamon, four cloves, bay leaf and salt. Two onions, carrots and turnips cut in slices; also one-half pint white wine; one-half of large raisins, chopped almonds, sliced pfefferneuse; also pumpernickel or rye bread can be used. Let it boil until the fish is done and the gravy thickens. Stir well but do not break the fish up. Can be served cold also, and is very refreshing and nourishing.

Stuffed Baked Shad, Bohemian Style.

When a fish is to be baked it should be emptied through the gills and the head left on. When this is done, wash the fish perfectly clean and prepare a filling of finely grated bread crumbs sufficient to fill it. Season this with pepper and salt; small onion chopped fine, a tablespoonful of chopped parsley and one-half teaspoonful of sweet marjoram; melt a piece of butter the size of an egg and pour over the crumbs after they have been well mixed with the seasoning. Stir together with a knife and mix with it a beaten egg. Fill the fish; lay it on a grate in a dripping pan; season it with salt and pepper and dust it lightly with flour; put in a rather quick oven. When it begins to brown baste it with butter and hot water. A large shad will require an hour to bake.

Make a sauce of half a small teacup of tomato or mushroom catsup, a glass of wine, the juice of a lemon and half a teacup of boiling water. Thicken this with a teaspoonful of flour mixed in a very little cold water and let boil up. When you have dished the fish up if there are any drippings from it in the pan add it to the sauce and pour over the fish; garnish with parsley.

Stewed Shad, Old German Style.

Chop a bunch of parsley and an onion very fine. Put this in a bowl full of tomato juice with four cloves, four allspices, a blade of mace and two chopped crackers. Have the fish cleaned and well washed and lay it in a stewpan. Pour over it prepared tomato juice. Season with pepper and salt and stew very slowly one hour. Thicken with a little brown flour. Add a glass of red or white wine and serve.

Shad Chowder à la Hugo.

Cut three-fourths pound of fat of pickled pork in thin slices; cut the slices into strips and cover the bottom of the pot with some of them. Have ready cleaned, boned and cut in small pieces about six pounds of shad. Lay on the pork a layer of fish seasoned with pepper and salt, put over a few slices of onions and cover this layer with buttered crackers. Then proceed as before with pork, fish and seasoning until you have used up the fish. Cover the top with buttered crackers and put on sufficient cold water to cover. Add a few potatoes cut in dice and four tomatoes cut in pieces. Keep the pot covered closely and stew slowly. If you find it getting dry add a little water occasionally. This may be improved by adding a few raw oysters to each layer of fish. Remove from the pot with a flat skimmer. It may be set in a hot oven covered closely to cook.

Potted Shad, Vienna Style.

After the shad has been cleaned, washed and wiped dry, cut into six pieces across the back, thus cutting each half of the fish into three pieces. Cover the bottom of an earthen crock with fish. Season with pepper, salt, whole allspice, whole cloves and two blades of mace to each layer of fish. Proceed in this manner until you have used all the fish. Cover with vinegar and tie some brown or paper leaf paper tightly over the top or it may be covered with a large plate. Bake very slowly for four hours. This is a nice relish served cold, and is very popular in Vienna and other German cities, especially on hot summer days.

Planked Shad en Bordure.

Split a shad in half and bone it. Melt a piece of butter mixed with lemon juice and fine chopped parsley. When hot put in shad and season with salt and pepper. Cover lightly with flour and bake in oven. When done put on plank surrounded with mashed potatoes. This dish is very easy to make and very popular.

The following two recipes are by the chef of San Francisco's oldest and best hotels. He considers the shad an excellent fish but asks that his name or that of the hotel be not mentioned.

Stuffed Shad.

Take one pint of California oysters, one-half cup melted butter, three-fourths cup fresh bread crumbs, chopped parsley, little chopped onions to taste, two hard-boiled eggs chopped, salt and pepper. Stuff the fish, place in baking dish, sprinkle with melted butter and roast in oven for fifteen minutes; then add pint of sour cream mixed with paprika and let simmer together for twenty minutes and serve in the same dish. Serve roe fried in butter as a garnishing.

Baked Shad.

Split the fish, salt and pepper well, dip in milk and flour and fry in butter for five minutes on both sides; place the fish in a baking dish, put a layer of sliced peeled tomato, and alternate with sliced green pepper on top of the fillet; sprinkle with bread crumbs and melted butter and bake in oven for twenty minutes; pour over the fish brown butter, adding lemon juice and chopped parsley and a few drops of Worcestershire sauce. Serve in baking dish. Have the roe meuniere (fried in butter) as garnishing.

BROILED SHAD.

Pop Ernest, the chef who introduced the abalone to the people of San Francisco, says he considers that the meat of the shad has a sweeter and more delicate flavor than any other fish we have. He prefers the shad broiled to all other methods.

Split the fish to remove most of the bones, dip in olive oil and broil over the coals. Serve with meuniere dressing.

Mr. Chas. Schmidt, formerly chef of Bergez-Franks, says that he thinks shad is one of the best fish on the coast and that it is equal in flavor to the striped bass, but that the reason it is not so popular is the difficulty that most people have in eliminating the bones. With expert handling, he says, the bones can be removed before the fish is cooked. The following he considers two of the best recipes for cooking the shad.

Shad au Four.

Prepare the shad in fillets, season with salt and pepper. Place in a pan some chopped onions, garlic and chopped parsley, lay the fish on these and pour over it white wine and lemon juice. Bake fifteen minutes in moderate oven; remove the fish, then blend fresh butter with garlic and pour over fish and serve. This is a light sauce and is preferred for use with this fish because the shad is often eaten with the fingers on account of the bones.

Shad Duglére.

Prepare as for shad au four, but add a small amount of tomato and fresh sliced mushrooms.

Mr. Oscar Schori, chef of Tait's, considers the shad one of our best fish and regrets that it is not more popular. He considers the following recipe one of the best:

Fillet the shad and season. Fry to a light brown in olive oil and serve with drawn or brown butter and lemon juice. (See shad meuniere above.)

He prefers the shad fried, but for those who prefer it broiled he thinks it is best to serve with Italian sauce or au gratin.

Fish Sauce (Italian).

Mash together three anchovies, two hard boiled eggs, add teaspoonful of parsley chopped fine and an equal quantity of onion juice. Add yolks of two eggs and teaspoonful of mustard with salt, pepper and juice of a lemon and beat until smooth.

CONSERVATION IN OTHER STATES.

PENNSYLVANIA GAME SANCTUARIES.

Pennsylvania has now six game sanctuaries established on state lands. Provision has also been made for the establishment of similar sanctuaries on leased lands. These game sanctuaries are surrounded by a fire trail and a single wire upon which are hung notices requesting co-operation in providing safety to the wild life within the refuge.

UNIQUE GAME LAW.

Nevada has a unique game law on her statute books which provides that every public school teacher shall read to the pupils the game laws of the state at least once a month. The educational value of such a statute is evident.

WILD LIFE PROTECTION FUND INCREASED.

Mrs. Russell Sage has recently signified her approval of the work accomplished by the trustees of the permanent Wild Life Protection Fund by making an additional gift of $15,000, bringing up her total subscription to $25,000. This donation followed the issuance of the trustees' biennial report, which appeared in

the form of a handsome book of 100 pages and was sent to editors and the leading libraries of the country as a contribution to the current history of wild life protection. The report announces a fund which has been created for medals to be awarded to Boy Scouts of America for achievements along the line of wild life protection. A campaign is now being pushed to establish game sanctuaries in national forests. The definite plan is as follows:

(1) A federal law empowering the Secretary of Agriculture to select and delimit areas in national forests suitable for game sanctuaries. (2) These sanctuaries shall be established by presidential proclamation. (3) These sanctuaries shall be so located that they will not occupy lands chiefly suitable for agriculture. (4) These sanctuaries shall be located where they will interfere to the least extent practicable with the grazing of domestic stock, especially the stock of actual settlers. (5) These sanctuaries shall be established with the approval of the governor of each state concerned. (6) It is expedient to establish a large number of sanctuaries of medium size rather than a few large preserves. (7) The ideal condition would be a chain of sanctuaries which in time would restore game to all the interesting territory. (8) Administration will be vested in the Secretary of Agriculture. (9) Boundaries are to be settled after full consideration of all conditions. (10) Predatory animals are to be killed. (11) The object of these sanctuaries is to provide breeding places for game which will spread over adjacent territory, where it will be subject to the regular open season provided by law. This will prevent danger of overstocking the ranges. It will therefore not be the general policy to extend these sanctuaries.

ITALY STOPS BIRD SLAUGHTER.

Under date of December 8, from Rome, the trustees of the Permanent Wild Life Protection Fund are informed by Frederic C. Walcott that "the Italian Government has at last passed a law, which goes into effect January 1, prohibiting the shooting of all song and insectivorous birds throughout Italy." If this prohibition also includes, as it is only fair to assume that it does, the netting of all such birds, then Italy has indeed carried into effect a great reform. The importance of this action to the birds and the crops of Europe is beyond computation. Hitherto the netting of song birds while on their migrations has been a widespread industry, and the deadly roccollo has each year slaughtered hundreds of thousands of the choicest song birds of Europe for food. Both in America and in England this abuse has been severely denounced, and as American bird protector has declared that it was "a reproach to the throne of Italy."

The causes which brought about this reform in Italy, in spite of the excitement of war, are as yet unknown.—*Zoological Society Bulletin*, January, 1916.

THE TRESPASS LAW IN ALABAMA.

Alabama successfully reduces the amount of hunting by requiring each gunner to obtain a written permit from a landowner before shooting on privately-owned land.

MINNESOTA ADVOCATES FEEDING QUAIL.

Carlos Avery, Game and Fish Commissioner of Minnesota, has issued a card giving directions for the feeding of quail. Loose straw, dead grass, and corn fodder are recommended as material for shelters. Screens, wheat, barley, rye, buckwheat, weed seeds, or corn are suggested as feed, together with a small pile of sand for grit. A pint of food is recommended as a sufficient daily ration for an average covey of 15 to 20 birds. Attention is also called to the fact that the bob-white is beneficial to agriculture and is highly prized as a game bird, and that mink, weazels, and house cats are dangerous enemies of these birds.

EDIBLE BIRDS' NESTS.

CURRENT ITEMS OF INTEREST (No. 27, January 13, 1916), is authority for the statement that, in 1909, 17,781 pounds of the edible nests of swifts, or swiftlets, as they are better called, valued at $109,849, were exported from Siam. In Hongkong, where the demand for these nests often exceeds the supply, the prices range from $15 to $25 per pound, according to quality.

"The first nests constructed in the season, which are composed of pure saliva, are the best for eating purposes. They are gathered on completion before the eggs are laid. The birds then build again, and the second nests, in which the saliva is mixed with rootlets, grass, etc., and often shows traces of blood, from the efforts made to produce the saliva, are also taken on completion. A third nest is then constructed of extraneous substances cemented together and the whole fastened to the wall by a little saliva, the flow of which seems to be practically exhausted. The birds are allowed to rear their young in these nests, which are

ers, so as to compel the construction of afterwards destroyed by the nest-gather fresh nests the following year.

Edible nests of swiftlets are found in the Malay Archipelago, Australia, and many of the Pacific Islands. In northern Borneo certain caves inhabited by these swiftlets produce $25,000 worth of nests every year and show no diminution in the quantity, despite systematic robbery for seven generations."

It is interesting to note that the natives of Siam and other countries where these swifts are to be found, have been wise enough to protect the birds from which they derived profit in such a way that the last statement is made possible.

LIFE HISTORY NOTES.

DUCKS FROM THE GREAT SALT LAKE TAKEN IN CALIFORNIA.

Last year there was recorded in our columns (CALIFORNIA FISH AND GAME, Volume 1, July, 1915, p. 191) an instance of the taking at Herndon, Fresno County, of a pintail duck bearing a band which led to the information that the bird had been banded on Great Salt Lake in September, 1914. A second instance of the same sort has come to light in the taking of a banded green-winged teal (*Nettion carolinense*) on the Heldzig ranch, twelve miles west of Delano, Kern County. Mr. Edward Richardson, of Porterville, secured this duck December 12, 1915. Word was received from Washington that this bird was labelled on September 16, 1914, at the mouth of Bear River, Great Salt Lake, Utah, after having recovered from the peculiar malady which attacks the ducks of this lake. Mr. F. W. Velie, of Porterville, also killed a green-winged teal at the same place this past winter which had been banded near the northern end of Great Salt Lake, September 26, 1915. These instances throw further light on routes of migration. It seems quite possible that many of our ducks, and probably also many geese, arrive in California via the Great Basin.—*H. C. Bryant.*

THE OPOSSUM IN ALAMEDA COUNTY.

Four opossums were killed and several others seen about one mile northwest of Pleasanton along the canals of the Spring Valley Water Company by men who were burning off tules and weeds during December, 1915. A rancher living a short distance from this spot has complained of strange animals which come into his corn and in his chicken yard and has supposed them to be opossums. This is apparently the first instance of the appearance of the opossum in this section of the country.

Opossums are numerous at Arden Station, between Newark and Alvarado, according to the report of Mr. B. Brown, who claims to have seen several, some of them quite large, on his property.—*Earle Downing.*

FAWNS BORN IN WINTER.

Mr. P. H. Oyer, of Pacific Grove, reports that on December 28, 1915, he saw a doe black-tailed deer (*Odocoileus columbianus scaphiotus*), with two spotted fawns about two weeks old in the sandhills on the Jack ranch, near Marina, Monterey County. This record is particularly interesting, since fawns are usually born only late in the spring.

NESTING OF THE SOOTY GROUSE.

There are a few grouse (probably sooty grouse, *Dendragopus obscurus fuliginosus*) on all of the timbered part of the California National Forest, but in spite of the fact that very few are killed by man they do not seem to increase. This is due principally to their habit of nesting on the ground in exposed places. Ranger M. W. Durham found three nests last spring in the open timber on the north side of Thomas Creek. These nests, which were in pine needles without protection, were watched. The eggs in two nests simply disappeared and the third nest was trampled on by stock.—*B. H. Mace.*

WILSON SNIPE UNUSUALLY ABUNDANT IN ALAMEDA COUNTY.

Wilson snipe (*Gallinago delicata*) were very abundant in the lowlands near Pleasanton, Alameda County, California, during the latter part of January, 1916. A few snipe are seen in this vicinity each year, but to see thousands of them is surprising. Flocks of twenty-five or more could be flushed at the same time. They would circle about for a few minutes and then alight at no great distance,

dropping almost straight down from high in the air. Two boys whom I saw leaving the hunting grounds each carried a fault of these birds all killed by shooting into flocks. A specimen secured February 11, 1916, gave additional evidence that these birds were snipe and not dowitchers.—*Earle Downing.*

THE OPOSSUM IN AMADOR COUNTY.

On February 1, 1916, I trapped an opossum about six miles from Ione, Amador County, in the vicinity of the Old Boston Store. This animal weighed fifteen pounds, and judging from the front teeth, one of which was decayed, the animal must have been very old. This is the first opossum ever seen in this county and mystery surrounds the reason of its occurrence. It is more probable that this animal escaped from captivity than that it traveled into this section from some locality where it is abundant. The nearest place from which opossums are recorded is Pleasanton, Alameda County.—*C. E. Tubbs.*

UNITED STATES FOREST SERVICE CO-OPERATION.

FISH KILLED BY MUD FLOW.

Fish in Lost and Hat creeks, Lassen National Forest, were killed during May, 1915, by the mud floods supposedly caused by the eruptions of Mt. Lassen. After the flood, while the water was still muddy, it became unnecessary, and even impossible, to use screens at the intake of irrigating ditches diverting water from Hat Creek and permission was secured to dispense with these screens. If Hat Creek does not become naturally restocked with fish, it should be artificially restocked.—*H. G. Merrill.*

ELK IN SHASTA COUNTY.

Favorable reports are continually received in regard to the band of elk which were liberated near Winthrop, Shasta County, in the early part of 1913. They seem to have spread over a considerable range of country and are multiplying with a fair degree of rapidity. Elk calves have been seen on several different occasions.—*M. R. Tillotson.*

TRAPPING FOR FUR IN THE SHASTA NATIONAL FOREST.

There is no one in the Shasta National Forest, so far as I know, who makes trapping his sole business, although there are several who do more or less trapping in season. No large catches have been made, and in fact, the business has been so poor that the trappers out each winter usually consist of those who have never tried the game before. The proposed fur farm at Medicine Lake has been abandoned. The greatest success seems to have been in trapping bear, of which more have been seen this year than for several seasons past.—*M. R. Tillotson.*

SIERRA MOUNTAIN SHEEP IN THE MONO NATIONAL FOREST.

The Sierra mountain sheep, at one time so abundant within the Mono National Forest, has probably totally disappeared from this region. A reliable resident tells me that he saw sheep in large numbers on the Sweetwater range in 1882, and Mr. L. Glass, formerly foreman of a large ranch, told me that he saw one in Alpine County about twelve years ago. On many of the high ridges in Alpine and Mono counties one finds heads with horns which do not show very great weathering. A prospector told me that he saw two sheep near Wellington on the edge of the Pinenut range last spring. While I have no grounds to doubt this, I am rather skeptical of its being a fact. However, it has not been many years since these animals existed in this territory and it is possible that a few still exist unobserved.—*W. M. Manly.*

TWO CINNAMON BEARS KILLED IN MODOC COUNTY.

I have knowledge of two cinnamon bears being killed in the western part of the county during the past summer.—*Wm. S. Brown.*

RABID COYOTES IN MODOC COUNTY.

The disease of rabies among coyotes made its appearance in Modoc County recently and on account of the danger to human life and to livestock, the State Board of Health, Biological Survey, and the Forest Service have organized a campaign for the destruction of coyotes. Seventeen hunters are employed, and the entire county is divided into an equal

number of districts, all under the supervision of a chief hunter. These hunters are armed with traps and rifles and use traps and poison in the extermination of coyotes. The situation is serious. Mad coyotes have been killed on the streets of the towns of Alturas and Cedarville. A county ordinance recently became effective raising the bounty on coyote scalps to $2.50 each. In addition to the government and state hunters many private trappers are at work and the state authorities are giving out poison to all responsible ranchers for use in extermination work.

The enthusiasm with which this campaign is being waged by federal, state and county authorities, as well as by the residents themselves, means, probably, the almost complete eradication of the coyote. This riddance of coyotes can hardly be overestimated as a factor in the conservation of our game. I believe it can be stated without fear of contradiction that the number of sagehens alone will be many times greater next season on account of this campaign.

So much poison is being used in the work that it will probably never be known just how many coyotes have been killed off. The best federal hunter on the job averaged better than a coyote a day during August, September and October. The Modoc County records show that bounties were paid on 1,337 coyote scalps during the period from February 15 to November 1, 1915. As the bounty during this period was only $1.00, a great many coyotes were undoubtedly killed on which no bounty was claimed.—*Wm. S. Brown.*

TROUT IN GOOSE LAKE.

Lake trout are plentiful in Goose Lake, and the recent lengthening of the closed season will insure an increase in their numbers. The number of these fishes caught the past season was much less than in former years, since fishing for them is mostly over when they are running the streams tributary to the lake and they were practically through running when the season opened. Fishing for them was "too easy" before the season was changed.—*Wm. S. Brown.*

GREY SQUIRRELS IN THE PLUMAS NATIONAL FOREST.

Grey squirrels are so thick in this district of the Plumas National Forest that very few pine or fir cones have been allowed to ripen and disseminate seed for the past three years, since the squirrels destroy or eat up the crop while in a green condition. During the season of 1913, many became diseased and died. This frightened many people out of using them for food and as a result very few are now killed. It is not uncommon to see 30 or 40 in a single day.—*A. J. Stanley.*

GOOD CASE MADE BY LASSEN RANGER.

There have been a number of violations of the fish and game laws which have come to the attention of forest officers. The only case, however, handled by the forest service was that of John C. Robbins, himself a deputy fish and game commissioner at the time, who was caught by Ranger Harvey Abbey with a freshly killed deer in his possession out of season. Robbins was arrested, tried in the justice of the peace court, convicted, and ordered to pay a fine of $150 or serve 150 days in jail. This decision was upheld and the fine was paid after some lapse of time, although the case went to the Superior Court and later to the Appellate Court, not on appeal, but on writ of habeas corpus, before it was finally settled. Since this case has already been fully reported on, it is unnecessary to go into the details about it again. It attracted much attention and became widely known, being mentioned at one time to my knowledge even in the Chicago Tribune. It was important since there is every reason to believe that Robbins had been a frequent and flagrant violator of the law and had used his badge and office as a means of violating the law without danger of detection. The effect of this case on the public was decidedly beneficial.—*H. G. Merrill.*

DEER SCARCE IN DESCANSO DISTRICT OF THE CLEVELAND NATIONAL FOREST.

It has been observed that there is an unusual scarcity of deer in the Descanso district of the Cleveland National Forest. Two causes are advanced for the scarcity. (1) All of this district is accessible to the automobile. This fact makes it possible for a larger percentage of people of the class who shoot everything in sight (doe, fawn or buck, in season and out of season) to get into this district. (2) The fencing of the boundary line between the United States and Mexico has no doubt stopped a lot of deer from coming into this district.—*C. O. Brenner.*

REPORTS.

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

December 1, 1915, to February 29, 1916.

Game.

Ducks	385	
Geese	69	
Shore birds	12	
Divers	5	
Quail	48	
Quail traps	3	
Sage-grouse birds	285	
Tree squirrels and skins	6	
Cottontail rabbits	17	
Deer meat	79	pounds
Deer hides	1	

Fish.

Striped bass	580	pounds
Steelhead	923	pounds
Salmon	18	pounds
Trout	14	pounds
Black bass	117	pounds
Crabs	805	
Clams	416	
Abalones	28	
Crawfish	106	
Miscellaneous fish	53	pounds
Illegal nets and fishing apparatus	41	

Searches.

Illegal fish and game	62

VIOLATIONS OF THE FISH AND GAME LAWS.

December 1, 1915, to February 29, 1916.

Offense	Number of arrests	Fines assessed
Game.		
Hunting without license	78	$1,190 00
Deer, close season, killing or possession, or sale	18	420 00
Female deer and skins, killing or possession	4	
Night shooting	5	50 00
Ducks, excess bag limit	1	25 00
Using live blinds to approach ducks	7	90 00
Quail, close season, killing or possession	6	135 00
Shore birds, close season, killing or possession	6	125 00
Doves, close season, killing or possession	2	25 00
Non-game birds, killing or possession	65	780 50
Cottontail rabbits, close season, killing or possession	7	85 00
Tree squirrels, close season, killing or possession	3	30 00
Total game violations	201	$3,515 50
Fish.		
Angling without license	4	$70 00
Fishing for profit without a license	6	50 00
Dealing in fish wholesale without license	1	25 00
Illegal nets	43	2,000 00
Young of fish in possession	2	
Trout, close season, taking or possession	2	20 00
Trout, taking other than with hook and line or spear	7	300 00
Steelhead, close season, taking or possession; excess bag limit	4	50 00
Shipping and offering for sale undersized catfish	2	100 00
Striped bass, underweight, taking or possession	3	70 00
Black bass, close season, taking or possession	2	100 00
Allowing crude oil to pass into State waters	1	
Crabs, undersized, taking or possession, shipping into closed district	15	95 00
Abalones, undersized, taking or possession	8	170 00
Crawfish, under and oversize, taking or possession	4	85 00
Clams, undersize, taking or possession; excess bag limit	2	10 00
Total fish violations	105	$3,145 00
Grand total fish and game violations	306	$6,053 50

LION BOUNTIES.

Statement of Lion Bounties Paid by Fish and Game Commission From January 1 to December 31, 1915.

County	1915	Total number on which bounty has been paid
Alameda		1
Alpine	1	1
Amador		8
Butte		30
Calaveras	3	11
Colusa	1	14
Del Norte	2	78
El Dorado		36
Fresno	1	12
Glenn		36
Humboldt	26	485
Imperial	1	1
Inyo	3	7
Kern	15	75
Lake	8	84
Lassen		6
Los Angeles	5	25
Madera	10	30
Mariposa	2	31
Mendocino	7	163
Merced		1
Modoc		3
Monterey	8	61
Mono		2
Napa		3
Nevada		3
Orange		4
Placer	1	27
Plumas		8
Riverside		13
San Benito	2	25
San Bernardino	1	14
San Diego	1	28
San Joaquin	2	2
San Luis Obispo	10	57
San Mateo		1
Santa Barbara	4	66
Santa Clara	1	8
Santa Cruz		1
Shasta	7	189
Sierra		6
Siskiyou	9	233
Sonoma		14
Stanislaus	1	4
Sutter		1
Tehama	4	149
Trinity	4	233
Tulare	8	57
Tuolumne	7	40
Ventura	7	30
Yuba		3
Totals	132	2,423

FINANCIAL REPORT.

Statement of Expenditures for the Months of October, November, December, 1915, and January, 1916.

	October	November	December	January
General administration, salaries, traveling expenses, rentals, supplies, etc.	$1,475 33	$1,[illegible] 63	$1,672 94	$1,[illegible] 86
San Francisco district, salaries, traveling expenses, rentals, supplies, etc.	4,770 02	4,807 82	4,[illegible] 21	4,524 39
Sacramento district, salaries, traveling expenses, rentals, supplies, etc.	3,812 09	3,547 66	3,[illegible] 90	[illegible] 43
Los Angeles district, salaries, traveling expenses, rentals, supplies, etc.	1,760 87	1,578 48	1,[illegible] 66	1,489 61
Fresno district, salaries, traveling expenses, rentals, supplies, etc.	2,187 80	2,184 31	2,190 98	2,[illegible] 76
Hatchery administration, salaries, traveling expenses, supplies, etc.	152 00	649 10	[illegible] 76	[illegible] 28
Fishery research and publicity, salaries, traveling expenses, supplies, etc.	606 91	613 67	[illegible] 08	[illegible] 31
Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc.	115 40	313 75	[illegible] 90	[illegible] 70
Fish transplanting, salaries, traveling expenses, supplies, etc.	278 78	75 71	7 80	----------
Fish distribution cars (1 and 2), salaries, traveling expenses, rentals, supplies, etc.	1,570 65	151 80	154 14	----------
Fish patrol launches, salaries, traveling expenses, rentals, supplies, etc.	469 26	[illegible] 44	[illegible] 57	[illegible] 07
Sisson Hatchery, salaries, traveling expenses, supplies, etc.	1,920 80	2,[illegible] 36	2,[illegible] 92	1,[illegible] 46
Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc.	----------	[illegible] 00	[illegible] 75	[illegible] 00
Tahoe hatcheries, salaries, traveling expenses, supplies, etc.	279 35	2 50	[illegible] 00	19 00
Price Creek Hatchery, salaries, traveling expenses, supplies, etc.	----------	----------	----------	----------
Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc.	----------	----------	[illegible] 06	[illegible] 00
Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc.	67 00	107 [illegible]	[illegible] 00	[illegible] 77
Bear Valley Hatchery, salaries, traveling expenses, supplies, etc.	----------	----------	[illegible] 98	----------
Mariett Lake and Carson hatcheries, salaries, traveling expenses, supplies, etc.	[illegible] 22	[illegible] 00	100 15	142 42
Fort Seward Hatchery, salaries, traveling expenses, supplies, etc.	----------	----------	----------	[illegible] 71
Inyo County Hatchery, salaries, traveling expenses, supplies, etc.	----------	----------	----------	[illegible] [illegible]
Game Farm, salaries, traveling expenses, supplies, etc.	[illegible] 02	[illegible] 06	[illegible] 98	[illegible] 72
Game research and publicity, salaries, traveling expenses, supplies, etc.	[illegible] 85	[illegible] 77	[illegible] 22	[illegible] 66
Prosecutions and allowances	[illegible] 70	[illegible] 13	[illegible] 85	[illegible] 90
Hunting license commissions and refunds	2,479 00	[illegible] 00	1,[illegible] 30	[illegible] 73
Anglers' license commissions and refunds	1,[illegible] 80	[illegible] 50	1,[illegible] 70	[illegible] 60
Market fishing license commissions and refunds	11 00	[illegible] 20	[illegible] 20	[illegible] 75
Crawfish and abalone inspection	[illegible] 00	[illegible] 00	[illegible] 00	[illegible] 00
Winter game feeding	----------	----------	----------	[illegible] 37
Mountain lion bounties	[illegible] 00	[illegible] 00	[illegible] 00	[illegible] 00
Printing and lithographing	1,1[illegible] 79	1,[illegible] 73	[illegible],[illegible] 12	[illegible] 78
Claims paid account accidents	[illegible] 25	[illegible] 00	----------	----------
Totals	[illegible] 84	[illegible] 65	[illegible] 90	[illegible] 39

Balances: November 1, 1915, $112,[illegible].88; December 1, 1915, $[illegible].13; January 1, 1916, $[illegible]; February 1, 1916, $114,[illegible].74.

CONTENTS.

		PAGE.
MALFORMED ANTLERS OF DEER	*Frank C. Clarke*	119
EARLY GAME CONDITIONS IN SISKIYOU COUNTY		123
THE TIMBER WOLF IN CALIFORNIA	*Joseph Dixon*	125
WILL CUTTING THE KELP INJURE THE FISHERIES?	*N. B. Scofield*	129
FISH AND GAME CONDITIONS IN SOUTHERN CALIFORNIA	*Edwin Hedderly*	131
EDITORIALS		136
HATCHERY AND FISHERY NOTES		150
CONSERVATION IN OTHER STATES		157
LIFE HISTORY NOTES		161
UNITED STATES FOREST SERVICE CO-OPERATION		163
REPORTS—		
California fishery products for three months ending March 31, 1916		166
Number of deer killed in various counties during open seasons 1914-15		168
Seizures		169
Violations of Fish and Game Laws		170
Financial report		171

Fig. 39. Columbian black-tailed deer (*Odocoileus columbianus [columbianus]*) Photograph by H. C. Bryant.

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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MALFORMED ANTLERS OF DEER.

By FRANK C. CLARKE.

Malformed antlers are not uncommonly found on the deer of the Pacific Slope. Much interest has naturally been attached to this phenomenon and numerous theories have been advanced by the hunters of deer and the students of zoology to account for "odd-shaped," "freak" antlers. Certain facts are known, but just why abnormal forms develop is largely a matter of speculation.

All normal male deer annually produce a pair of antlers. These antlers are developed during the spring and early summer and while maturing they are very tender, sensitive organs, easily influenced by internal as well as by external stimuli.

Each species of the deer family has its general type of antler, this type varying considerably according to the age of the animal. A perfect pair of antlers is exceptional rather than common. Though seemingly normal and well balanced, certain differences exist between the two members. These small differences, so far as one may judge, appear to be normal individual variations. But within each of the species, pairs of antlers will often be found which depart widely from type.

Abnormal antlers are of two classes: (1) Those which are the result of direct external stimuli; and (2) those which are the result of internal or indirect stimuli.

External stimuli are those which directly affect the growing antlers. An antler may be injured by contact with the brush or other solid obstacles. One may occasionally find antlers which have been injured or broken and which have healed much like broken bones, an enlargement or bump being left at the point of breakage. This healing may occur without changing the general shape of the antlers. However, when the injury is severe, the growing antlers may change their shape considerably.

Internal or indirect stimuli are those which influence the growing antler through the general condition of the deer. The health of the animal may be greatly influenced by food conditions. Injuries to the bones, or severe flesh wounds, or injury to the sexual organs may also affect the growth of the antlers. The normal healthy buck produces the most uniformly shaped organs of defense. The fatter the buck during the growing period, the more robust will be the antlers. In a very fat buck the basal portions of each antler possess many small protuberances on the main beam. Such protuberances are as thoroughly normal as are the "eye guards," or basal prongs. The antlers of a thin buck are usually quite smooth.

Malformations are brought about in greatest numbers as well as in most striking forms by the indirect and internal influences. The following groups of cases tend to support this contention

1. *Effects of Malnutrition.* As noted above, thin deer usually possess slender antlers because these organs have been insufficiently nourished. Antlers of this type are shown in Figure 40. The buck here pictured was kept at the State Game Farm and was very poor in flesh during the spring and summer of 1913. At that time he was probably three years old. Ordinarily, a thrifty deer of that age has several large prongs to each antler. Many other cases, similar in nature, could be cited. It is a well-known fact that deer from the redwood belts, where food is scarce, are seldom fat or large. The antlers are likewise small and slender. Bucks from the oak and chemisal districts, on the other hand, are more apt to be large and fat and to possess strong, heavy antlers.

Fig. 40. Malformed antlers of a black-tailed deer kept at State Game Farm. Photograph by Frank C. Clarke, July, 1913.

2. *Result of Injury.* Severe bodily injuries, or the breaking of a bone, may cause the antlers to become malformed. This is not always granted, and many people contend that the malformations are due to injuries to the antlers themselves at the time this other injury was sustained. However, since nearly all injured bucks develop deformed antlers, and nearly all bucks with deformed antlers reveal the presence of a wound sustained at some previous time, and also the malformation in the antlers appears to develop almost always on the same side as the injury, this contention does not seem reasonable. Furthermore, where both sides of the animal have sustained an injury, both antlers will usually become deformed. Injury to the sex organs (testes), is followed by a peculiar kind of malformation which no direct injury to the antler itself seems to produce.

Hence, it is evident that internal, indirect stimuli, as well as external stimuli, may affect antler growth. In many cases both kinds of stimuli

influence the growing antler at the same time. The following authentic cases are given as illustrations of this point:

(*a*) Large, fat buck, killed August 24, 1905. The antlers were practically mature, but still in the velvet. They were forked and about evenly balanced as to size, but one antler grew at right angles to the other instead of being parallel to it. Upon examination it was found that this deer had had three ribs broken several months before capture.

(*b*) Large buck with normal antler of three points on one side; on the other side a long, unbranched antler in the shape of a letter S. This buck had previously been wounded in one of its hind legs.

(*c*) Large buck with normal "four point" antler on one side and a long "spike" on the other. This kind of deformity is frequently reported by hunters. This buck had previously been severely injured.

(*d*) Very large old buck. Both antlers were extreme freaks. There were several prongs to each member. The antlers were very short; for after growing almost as long as the ears they grew inward and then downward toward the head. They were very irregular in every respect. This deer had previously been wounded in the back of the neck, in one fore leg, and in one hind leg.

(*e*) Large buck killed in autumn. A normal "three point" antler was found on one side, and on the other side a forked antler which turned inward and downward toward the head. There was an off-set in the bone of one hind leg of this deer, and the fracture was on the same side as the crooked antler.

(*f*) Similar to (*e*). A normal antler of three prongs existed on one side, whereas the other turned inward and downward. This deer had been shot through the front leg on the side of the deformity.

Fig. 41. Malformed antlers of coast mule deer stag. Antlers such as these are retained permanently and continue in the velvet. Photograph by F. C. Clarke taken at San Diego in 1912.

3. *Result of Castration.* If castrated when young, a buck will not produce antlers of much size, if any at all; and if antlers are produced, they will be greatly deformed. If castrated when in the velvet the deer will retain his antlers permanently. They will continue to grow slowly but in a very irregular shape and will always retain the velvet (see figure 41). Several hunters have brought in deer in the late winter as well as at other times of the year with antlers in this condition.

It is claimed by experienced hunters that, if a buck is castrated when his antlers are mature and the velvet shed, he will not drop them. This claim is based on the fact that castrated deer have been found with normal "hard" antlers at the time of year when they should have been shed. Evidently these bucks had been castrated after the maturity of the antlers for that year. The cause of the castration of deer in nature is almost as puzzling as that of malformed antlers. Few facts are known concerning this phenomenon.

The commonest form of antler found on deer stags is that shown in figure 42. Each is proportionately large at the base, often from six to ten inches in circumference. The antlers, furthermore, are short and stubby with many knobs or bumps upon them.

Fig. 42. Malformed antlers of unusual type, causes unknown. Photographs by P. C. Clarke.

A "spike" buck (yearling) under observation was castrated when the "spikes" were immature. They remained in practically this same condition for a year, when the deer was killed. A stag that was killed late in the winter when antlers were normally shed, still possessed a pair of "forked" antlers. They were soft and in the velvet.

A very unusual pair of antlers from a medium-sized buck killed near Laytonville, Mendocino County, was brought to my attention in August, 1911. On the left side was a well-formed forked antler about eleven inches long. The velvet had been completely shed. On the right side was a deformed antler not over four inches long. It was about three-fourths of an inch in diameter and maintained its size

nearly to the tip. Over the right eye it curved outward and downward. The surface was roughened by many small protuberances. The velvet still persisted. This deer had previously sustained a severe injury in the pelvic region which tore one of the testes from its position and caused it to shrivel up.

In conclusion:

(1) Malformed antlers are due to a number of causes.

(2) Internal as well as external stimuli affect the growth of antlers.

(3) Castration, or removal of the testes, prevents the growth, development and maturity of the antlers. Hence, the testes apparently produce an influence which is necessary for the development of secondary sexual organs, such as antlers.

EARLY GAME CONDITIONS IN SISKIYOU COUNTY.

[The following statements contributed by A. E. Doney, Peter Klink, and William Russell give a vivid picture of game conditions and hunting in the early days in Siskiyou County.—Editor.]

In the summer of 1873 my father took a party of six young men, our present sheriff, C. B. Howard, R. Walker, my three brothers and myself, on a hunting trip from Scott Valley to the meadows on Scott Mountain, 10 miles south of Callahan's Ranch. We were in camp six days, and during that time I saw from twenty to sixty deer each day, largely does and fawns; on going up to the higher levels we found bucks. This was the report from all of the party.

My father, W. K. Doney, was a pioneer of California of the '50 period. He did not believe in killing does and fawns; his instructions were to kill only the bucks, and of these no more than needed for meat for camp and a few pounds to take home dried, and this rule was strictly adhered to at all times.

In the summer of 1881, I went over the same ground alone on a hunt of three days and saw no deer, but during those three days the stench of the carcasses of deer that had been killed by hide hunters was in evidence, and I was never out of it until I left the range. I saw the rotting remains of so many deer and became so incensed against the men who were doing the killing that I felt like a man might who would look upon the act as murder. Even to this day, this region has not recovered from the wanton slaughter.

I remember a trip from the valley with my father in 1878. The day we went up North Coffee Creek in Trinity County, I counted 158 deer. The deer paths to the numerous licks below, near the stream, were cut by the deer from one to three feet deep along the hillsides. I killed a fine buck that evening near camp. This was the only deer killed on the trip, as we were prospecting and not hunting. The region to the west of Scott Valley, known as the Marble Mountain country, was, up to 1880, teeming with game, especially elk. One evening in 1876, a party of us were camped at Elk Lake, when a drove of elk, numbering over 75 (that many were counted), came down the opposite hillside to the lake. Two were killed. The last elk disappeared from that region about 1881.

F. M. Blooms, my partner in mining operations at Callahan's in 1881, who had been driving teams for Denny Brothers for five years prior to

that date, hauling freight between Redding and Callahan's, was told by Mr. Johnson, of the forwarding firm of Bush & Johnson, Redding, that in 1880 they had handled 35,000 deer hides from Siskiyou, Trinity, and Shasta counties. I later learned, from men who had bought them, that the average price paid for deer hides was fifty cents each. William Asher, whom I met in southern Oregon, told me that in 1888 he and a man named Bowen had killed deer and shipped 3,000 hides to San Francisco.—A. E. Doney.

I hunted for Mr. J. H. Sisson ten seasons prior to 1883, at which time I located the farm now owned by Robert Rull. During that period I hunted about the headwaters of the Sacramento River to the west of Sisson Tavern and Strawberry Valley (in which the Tavern is located). Often in a day's hunt I have seen the carcasses of as many as six deer lying about with the hides removed. This was the result of the hide hunters' work. I did not meet the hunters themselves, because they would hunt during the early summer, then move, so that when I went out for the deer to take to Mrs. Sisson's hotel, I found the deer had been killed off in many localities. The does and fawns were killed as well as the bucks. At no time did I ever kill a deer for its hide, but as there was no law to regulate the bag limit I have killed as many as four and five deer in one day, going out one day, hunting the second day, and returning the third day. This I would do about once a week during the tourist season, July, August, and September, after which the deer would leave the range for the lower hills of Shasta County for winter.

I know that many hundreds of deer were killed for their hides. The hunters came through the mountains and were not seen along the traveled highways. I would always get one or more deer up to the middle of September, when they left the range. The deer were still plentiful when I stopped hunting, but three years later there were very few deer to be found, and from reports I got from others the hunting was poor, and has so continued. I have been told that the deer are more plentiful since protection has been given them. I heard that many deer were killed in the lower country during the winter by squaw men along the Sacramento and Pit rivers who mined a little and killed deer for hides and meat.—Peter Klink.

In the year 1877, Walter Scott, afterward killed by an Indian on the mountain between Sisson and McCloud while going to Huckleberry Valley where he had his homestead, told me that he killed about sixty deer in less than six weeks. Scott was an old-time hunter and trapper. No use was made by him of the meat, the hides only being taken and the carcasses left in the woods. To my knowledge he had great bundles of hides. The hides probably numbered three or four hundred, and an equal quantity were perhaps obtained three or four times a year. This sort of hide hunting continued for five or six years.

I saw the last two elk that were killed in this district; one, a female, killed by John Burchard in 1872, the other killed by Bob Melson, in 1873. The horns of the latter were placed in the Sisson Tavern office. These were, I believe, the last two elk seen in this country.

The last mountain sheep was killed in Shasta Valley by George Conner on a Sunday morning in 1873.

There are very few antelope left in this country. In the year 1880, I saw forty or fifty on Butte Creek. I was in the Butte Creek country last summer and Mr. Whitney told me there were not more than a half dozen left.

When Bob Melson and I were herding cattle we killed on one occasion thirty-six deer. We took the hides and the best part of the meat and left the remainder. Another time I killed five deer in one day.

In the days of which I speak there were not one-tenth as many people in the country as there are now, and as the game laws were not in existence then, the people killed wantonly all kinds of game. Conditions are quite the reverse at the present time since there is not one-tenth of the game and the country is thickly settled. Therefore, if the laws protecting what is left of the immense herds of deer and other game were removed, all game would be completely demolished.—WILLIAM RUSSELL.

THE TIMBER WOLF IN CALIFORNIA.

By JOSEPH DIXON.

[Contribution from the Museum of Vertebrate Zoology of the University of California.]

Is the wolf in California to be classed as extinct along with the grizzly bear?

Timber or gray wolves of some species undoubtedly existed at one time in a wild state in California, probably within the last fifty years. The observations of early settlers, as well as other comparatively recent reports (Price, Zoe, IV, 1894, p. 331), seem to establish this fact with certainty. At the present time, however, there is, other than these reports, no tangible evidence of the former occurrence of wolves within the state, no specimen of a California-killed wolf—skin, skull or bones—being in existence in any collection, to the author's best knowledge. It is quite possible, nevertheless, that wolves still exist in certain remote parts of the state. Frequent reports, based on tracks, howls, or occasional glimpses of the wolves themselves, emanate from various parts of the state, notably from the region known as "Trinity Buttes," at the western boundary of Trinity County; and there are other wild, sparsely-settled sections of the state, which, on account of their natural ruggedness, may still afford sufficient food and protection for wolves.

For several years past the Museum of Vertebrate Zoology, as opportunity offered, has endeavored to corroborate reported occurrences of timber wolves in California, but without obtaining a single specimen. Several quite convincing reports of such captures have reached the Museum from time to time, but whenever the skin or skull was secured, the animal always proved to be a large Mountain Coyote (*Canis latrans lestes*). Under the circumstances it seems desirable that there be placed on record a clear statement of what knowledge we have relative to the present status of the timber wolf in California, with the hope of arousing interest in anyone who may find himself in a position to contribute information. The appended summary of the more conspicuous distinctions between wolf and coyote, it is believed, will enable anyone

who may secure specimens to identify with certainty the animal at hand. In case of the capture of a bona fide timber wolf within the state of California, it is strongly urged that the captor afford the author of this article an opportunity of verifying the occurrence.

There are three recognized races of the coyote in California, according to the latest authority: Grinnell's *Distributional List of the Mammals of California* (Proceedings California Academy of Sciences, 1913, [4th Series] III, pp. 265–390).

The Mountain Coyote (*Canis latrans lestes*) is found in the mountains of northern California, and south in the higher parts of the Sierra Nevada for almost their entire length. The Valley Coyote (*Canis ochropus ochropus*) ranges throughout California west of the Sierra Nevada and the southern Sierras, south to the Mexican line. The Desert Coyote (*Canis ochropus estor*), as its name implies, occurs on the Colorado and Mojave deserts, west to Antelope Valley and north to the Inyo region. The Valley and Desert coyotes are usually distinct in their small size and short hair. It is the Mountain Coyote, relatively large and shaggy, that is generally mistaken for a timber wolf, often through comparison with one of the other coyotes.

Sight identifications of wolves are not always to be trusted, for coyotes seen at a distance, under certain conditions of light, may sometimes appear to the human eye as veritable wolves. This may be due to the person merely misjudging the distance and therefore the size of the coyote, or the refraction of the light waves may possibly cause distortion, and seemingly increase the size of the animal. Neither are footprints to be trusted, for large dog tracks may be mistaken for those of wolves. The voice of wolf or coyote, however, should be distinctive, for one who knows either could scarcely confuse the deep-chested howl of the timber wolf with the shrill yelping of the coyote. With the animal in hand there need be no confusion. Between the largest coyote and the

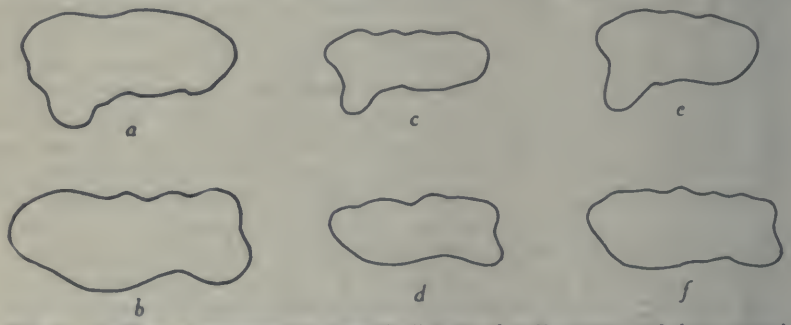

Fig. 43. Outlines of carnassial or "chopping" teeth of wolf, coyote, and dog; natural size. Wolf: a, upper; b, lower. Coyote: c, upper; d, lower. Dog: e, upper; f, lower.

smallest timber wolf there is great size difference. The weight of the wolf averages twice that of the coyote. Seton (*Life Histories of Northern Animals*) gives the weight of three male wolves (*Canis occidentalis*) which he trapped in Colfax County, New Mexico, as 102, 90, and 78 pounds, respectively. Two females from the same place weighed 75 and 80 pounds, while a very poor female weighed only 55 pounds. In speaking of the weight of large male coyotes (*Canis latrans*) Seton gives

42 and 46 pounds as the extremes, with 24 pounds as the average weight of females.

Besides the general size difference there are distinctions of skull, teeth and claws. In making the following comparisons in these regards, the skulls used are of a wolf from Vancouver Island, British Columbia, which is one of the smallest in the Museum series, and a coyote skull from Fort Tejon, Kern County, California, one of the largest of a hundred and fifty or more in the Museum collection. The wolf skull, cleaned, weighs fourteen ounces, the coyote skull, nine ounces. The wolf skull is nine and three-quarters inches long, and five inches broad; the coyote skull, eight inches long, four and one-eighth inches broad. Then, as to the teeth: Those of the wolf are about 50 per cent larger than those of the coyote. This is particularly noticeable in the canines and in those teeth lying third from the back, called "carnassials" or "chopping teeth" (see fig. 43, *a, b, c, d*). In the wolf the upper canine, where it enters the socket, has a diameter of 15 mm.; in the corresponding tooth of the coyote this measurement is 10 mm. In the wolf the upper carnassial (fig 43, *a*) measures 26.4 mm. in length, 14.6 mm. in breadth; lower carnassial (fig. 43, *b*), 30.4 mm. by 11.6 mm. Corresponding measurements in the coyote are: Upper carnassial (fig. 43, *c*), 20 mm. by 9.3 mm.; lower carnassial (fig. 43, *d*), 22.5 mm. by 8 mm.

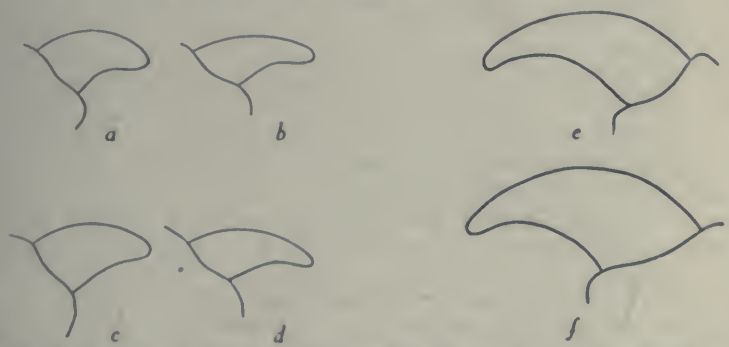

Fig. 44. Outlines of claws of coyote and wolf; natural size. Coyote claws from Sierra Nevada; worn and shortened from contact with stony ground; a, front foot; c, hind foot. Coyote claws from Colorado Desert; long and unworn; b, front; d, hind. Wolf claws; e, front; f, hind.

Another marked difference between the wolf and coyote is in the relative size of the claws (fig. 44, *a, b, c, d, e, f*). The diameter of the claw at the base should be taken in measuring, as length of claw evidently varies with the character of the soil that the animal ranges over. Coyotes inhabiting rocky regions have the claws much worn down and shortened, from contact with stones, while those living in sandy or loamy places have long claws, showing little wear. Fig. 44, *a* and *c*, represent typical worn coyote claws from the Sierras, while *b* and *d* represent longer, narrower claws from the sandy Colorado desert. One of the heaviest coyote claws noted measured 7.5 by 4 mm. at its base; an average wolf claw measured 11.5 by 7 mm.

In cases where scalps, only, are available, the size of the black nose pad (the naked skin about the nostrils) will be found to be the best character in distinguishing wolves from coyotes. The dried nose pad

of a coyote averages about seven-eighths of an inch in width; that of a wolf, one and one-quarter inches (fig. 45, *a* and *b*). An unusually large coyote skin at hand has a dried nose pad almost fifteen-sixteenths of an inch wide. An Oregon wolf has a dried nose pad one and three-sixteenths inches wide, while in a large Alaska wolf skin this pad measures almost one and one-half inches in width.

No very young wolves have been available for examination. Bailey (U. S. Dept. of Agriculture, Biological Survey, Circular No. 69, 1909), gives the following color differences between young wolves and coyotes. In the wolf the muzzle is blackish at birth, fading in six weeks to grayish. The head of a young wolf is grayish in decided contrast to black of back, ears and nose. The ears are black at the tips, fading to grayish in about a month or six weeks. In the coyote the muzzle is tawny or yellowish brown, becoming more yellowish with age. The young coyote head is yellowish gray not contrasted with rest of body. The ears are dark brown at the tips and back, soon fading to yellowish brown.

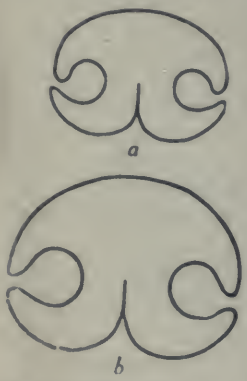

Fig. 45. Diagrams of nose pads; natural size: a, coyote; b, wolf.

There is great difficulty in distinguishing certain types of dog skulls from wolf skulls. This is often much harder than to discriminate between coyote and wolf. As a general rule the muzzle of the dog is shorter and broader than that of the wolf, the latter being most nearly approached among domestic dogs by the collie. In all cases, however, there are certain differences to be depended upon, as follows: In skulls of equal size the wolf has much larger and heavier teeth than the dog. While the average dog skull is not as large as that of a small wolf, still, among the larger breeds of dogs there may be individual skulls equal in size to those of timber wolves. In such cases the dog's teeth will be found to be relatively smaller and probably actually shorter and narrower than the corresponding teeth of the wolf skull of equal size, or even of one considerably smaller.

Coyote skulls can usually be told from dog skulls by their more slender form. The long, tapering muzzle of the coyote is in strong contrast to the broad muzzle of the average dog. Like the wolf, the coyote has *relatively* larger teeth than the dog.

On the under side of the cleaned skull, just behind the articulation of the jaw, and below the ear cavity, are to be seen two hollow, thin-walled, bony prominences, roughly circular in shape, and raised conspicuously above the general surface. These are known as the auditory bullæ, and their size and shape form excellent characters for distinguishing dogs and wolves. In the dogs these projections are relatively small and flattened; in wolves and coyotes they are large and more prominently raised.

As it is highly desirable that specimens of the California timber wolf be saved before the species disappears entirely from the state, if indeed it is not already too late, the author urges on anyone who has secured, or who may in the future secure, what he believes to be a timber wolf, that he apply the tests outlined above. Any fragment, an old skin in

part or whole, or any leg or foot bones that may remain attached to such a skin, etc., might serve for identification, and is consequently worthy of preservation. It must be urged, also, that exact information with any specimen is of the highest importance, the principal points to be ascertained being exact date and locality of capture, and name and address of captor.

The author of this paper is highly desirous of getting into communication with anyone who knows of the whereabouts of any parts of wolves killed in California, or who is conversant with *facts* relating to the past or present occurrence of the species within the state.

California Museum of Vertebrate Zoology, Berkeley.
April 14, 1916.

WILL CUTTING THE KELP INJURE THE FISHERIES?

By N. B. Scofield,

In Charge Commercial Fisheries, California Fish and Game Commission.

It has long been known that the kelp along the Pacific coast contains a large per cent of potash, and considerable experimenting has been carried on to find methods of gathering it and of extracting the potash and other commercially valuable by-products.

Germany has hitherto furnished the bulk of our potash supply from the deposits in ancient lakes and seas. The United States Department of Agriculture, realizing the importance of having a source of supply within the United States and hoping to encourage the greater use of potash as a fertilizer, started an investigation of our kelp beds and conducted experiments in extracting potash from kelp. The results of these investigations are to be found in Report No. 100 of the United States Department of Agriculture.

It is believed by the government officials who have investigated the kelp beds along the California coast that there is enough kelp from Point Conception to the Mexican line to supply annually, without injury to the beds, all the potash used in the United States. The amount of potash consumed annually, before the great war cut off the German supply and raised prices, was 300,000 tons and its value was approximately $15,000,000.

Kelp is composed very largely of water (80 to 90%); to extract the potash profitably large quantities must be handled and a great outlay of capital is required. The rise in the price of potash occasioned by the war has induced several large companies to build plants at Long Beach and San Diego where kelp is now being harvested. The companies operating are Swift & Company, the Hercules Powder Company at San Diego, and the American Products Company at Long Beach. Almost $3,000,000 has already been invested in southern California in this industry.

There has been considerable uncertainty as to the effect the cutting of kelp will have on the fisheries of the state. Many fear that the kelp beds will be destroyed and the protection which they now afford the beaches will be removed. This they think will greatly injure the clams which inhabit the beaches and the spiny lobsters which live

more or less within the protection of the kelp. They also fear that the young fish, especially the young barracuda, which are in the habit of seeking a refuge in the kelp, will be deprived of this refuge and will leave that part of the coast. It is also believed by many that the kelp beds are extensively used as spawning places by many other commercial fish. It is thought that the removal of the kelp will, therefore, destroy these spawning beds.

Captain Crandell, of the Scripps Institution for Biological Research, at La Jolla, was employed by the government in kelp investigations and is still engaged in watching the effect of the cutting by the several large companies. He and others engaged in the work express the opinion that these companies are not likely, at least within the next few years, to devise kelp cutters or reapers which will cut the kelp more than six feet below the surface of the water, and that such small cuttings can have but little effect. It has been observed that, after one of these reapers has passed over a bed and cut the kelp to a depth of six feet, the uncut kelp branches rise to the surface and it is difficult to see where the cutter has been. Much of the kelp, especially along the edges of the beds, can not be touched and this continues to afford protection to the beaches. It has been pointed out that great masses of kelp are more easily detached from their "hold-fasts" by violent storms than are smaller beds, and it is believed that where beds have been subjected to cutting they will not be so easily washed out by storms. Furthermore, the kelp, though cut six feet below the surface, will continue to serve as a refuge for fish.

The species of kelp which is being harvested in California is the *Macrocystis pyrifera*. This grows in long strands from one to three hundred feet in length which are held to the rocky bottom by means of a "hold-fast." The leaves float out on the surface of the water and are held suspended by floats containing air spaces. The plants reproduce by spores which lodge on the bottom and start new plants; and by stooling or sending off branches from near the hold-fast. If the top end of a plant is cut off, the rest of that particular plant ceases to grow, but the shorter branches, which are continually arising from the base, soon grow up and take its place. Experiments are now being conducted at La Jolla for the purpose of determining the rate of growth of these plants, and it is believed that the cutting of the kelp near the surface will tend to make them stool, so that the growth will be increased by the cutting.

It is to the advantage of the companies engaged in cutting the kelp to avoid destroying the beds, and to cut them only as fast as they will reproduce themselves.

It is believed by government experts that, even if the entire potash supply of the United States were to be derived from kelp, none of the beds would be injured, unless possibly some bed that is favorably located close to the harbor where several companies are at work.

The regulation of the kelp industry in California will come entirely under the jurisdiction of the state, for the beds are all within the three mile limit. It is the desire of the federal government that the state devise and pass such laws as will protect this potash supply and at the same time assure the companies operating of a continuous supply of kelp and protect them from the interference of "pirates." It will

therefore be necessary to enact laws under which kelp beds may be leased or apportioned to operating companies under regulations which will assure continuous crops.

The administration of the kelp resources falls to the Fish and Game Commission. No state laws have as yet been passed in this regard, but several counties have passed ordinances intended to protect the kelp beds. These ordinances have been passed through fear that the kelp beds will be destroyed and bathing beaches and the fishing industry ruined. It is probable that these county ordinances are unconstitutional.

Experts from the Scripps Institution in the employ of the government are continuing their investigation of the kelp-cutting industry and are watching results carefully. The Fish and Game Commission is also keeping in close touch with the progress of the industry with a view toward proposing laws which will conserve this resource upon which one of the greatest industries of the state will probably be based —an industry which may yield more profit than all of the fisheries combined.

FISH AND GAME CONDITIONS IN SOUTHERN CALIFORNIA.

By Edwin L. Hedderly,

Assistant, Los Angeles Branch Office of Fish and Game Commission.

Fish and game conditions in southern California were seemingly better during 1915 than at any time since the need of short seasons and low bag limits was adequately recognized. If the "Protection and Propagation" policy pursued by the Fish and Game Commission needs vindication, it is surely found in the splendid sport which has been built up in the south by the scientific adjustment of the "taking privilege" to the annual increase and the vigorous and uncompromising enforcement of the closed seasons. Conceding the importance of the part played in bringing about this happy result by the culmination of a succession of favorable breeding years, the fact remains that, without the support of fish-cultural work, the trout in our streams would long since have been so reduced as no longer to attract anglers; without wise laws well enforced, our brushy hillsides would have been cleaned of their quail, our canyon-washes of their doves, and our deer would have been destroyed for the men not devoid of energy to go and get them. Instead of this paradise of sportsmen which is so rapidly establishing national records for angling and hunting interest, as evidenced by phenomenal license sales, the south with its wonderful population increase, in which these attractions have played no small part, would long since have forgotten the clarion call of the cock quail and would have come to consider the mournful cooing of the dove as a curiosity. No longer would the southland lure the upland shooter; forgotten would be the lure of the gamest little bird that ever outran dog or tricked the superior intelligence of man. No less of an economic than of a sentimental calamity has been avoided by the long course of carefully-considered, earnestly-executed work undertaken to maintain these sporting assets of the state at the height of their possible attractiveness. All California has learned what these attractions mean in dollars and cents,

waiving for the moment the less tangible aspects. The idea is now growing, however, that the power of fish and game to make the "open places" inviting is a much more significant fact that the dollars-and-cents item.

What the year 1916 has in store for the southern California sportsman is yet to be written as concerns game, although the fishing features have already placed themselves on record. Great as was 1915 in the annals of southern trout fishing, both in average sport and numbers taking part, the current season is certain to be greater. Washed, and literally scoured by the storms of January, which tore down the mountain gorges of the steep San Bernardino and San Jacinto watersheds, ripped out rocks larger than city blocks in places, and generally played havoc with streams east of Los Angeles, the plantings made last October by the Fish and Game Commission appear to have saved the day, and these fry remain in the headwaters in sufficient force to guarantee good late fishing when the waters go down and the fish have grown larger.

So remarkable has been the attention paid to the streams thus far that the noncompetitive nature of trout fishing has asserted itself and caused many of the unthinking to doubt the abundance of fish that the experts readily recognize. With rods twenty to the mile, and more, even the ablest of anglers realizes the impossibility of creeling limits; and no end of heavy stocking can correct the natural shyness of the trout to such a point that all difficulty of taking the fish is eliminated—nor does any true sportsman desire to see the game rendered so easy were it even possible. In one sense the very abundance of anglers has had some little value as a protective feature, for it has rendered large catches difficult and hence placed every possible premium upon the refinement of skill. Hand in hand with the inculcation of respect for short seasons and low limits goes the perfection of refined methods giving equal satisfaction from lessened exercise of the "taking privilege"; and in this we find the four-ounce rod, the gossamer leader, and the fine-artist of the fly coming to the fore in southern California angling, even as the narrowed gauge and lightened weight of the "small-bore" have given the gunner greater pleasure in taking present-day limits than the unpardonable butchery of the ten-gauge days that left every man of fine sensibilities so satiated at the end of a "big day." Difficult as it is to explain the psychology of the sportsman to those born without the Jovian fire, the fact remains that to men who shoot and fish, the carnal elements play no part whatever. The supposed thirst for gore exists only in the imagination of those without capacity to understand what it is that makes mature men run over hills and scramble up boulder-bestrewn streams to the uttermost lengths of physical endurance merely to gather a few hard-earned birds or fish. It is the idealism that makes possible the one that goes hand in hand with the esthetic feature of refining method. There is some of the artist in every sportsman; and the more proficient, the higher proportion of pleasure taken in method rather than in mere aggregate.

Some bass fishing has been built up in the southern reservoirs from the plantings made in years past, although the conditions are not ideal for these fish in most places where they are found. The storms of January destroyed several artificial lakes in which bass have become

well established, but the possibilities of thus propagating them have been satisfactorily demonstrated, and now only time is needed to restore them.

Great interest has developed among surf-anglers in the striped-bass plantings to be made by the Commission in the lagoons and bays wherein fresh water mingles with salt, thus affording the conditions essential to the anadromous nature of these fish.

With the tendency to carry sport to the highest plane of refined method already exhibited in fresh water and upon the game fields, the southern surf-casters for corbina, yellowfins, and croakers, fishes peculiar to these shores, have developed a light-tackle, single-handed, two and one-half ounce sinker-casting technique peculiarly their own. This is far ahead of the advanced type of gear used on the Atlantic, notwithstanding the longer experience of eastern anglers. With the experience gained upon the smaller fish of the surf, and the knowledge of handling the hard-fighting yellowtail of the channel upon lines breaking at less than the weight of the fish, these men will be ready to accord the striped bass a right sporting welcome if he succeeds in adding himself to the list of our surf and bay game fishes. All the rod and reel clubs have pledged themselves to aid in watching these bass and aiding in their welfare.

Fishing off the southern coast has been better this spring than in several seasons. For six weeks an immense influx of barracuda has been literally glutting the markets. The boatmen of Catalina took two tons on hook and line in a single day recently. Although the barracuda is ranked as a food fish and plays a leading part in the fresh-fish supply of the southern markets, it is not devoid of game possibilities, and when taken upon light tackle usually employed by experts in sea trolling, it puts up a tussle that is highly diverting. It has the particularly interesting trick of dodging suddenly if "given its head" which proves profitable to vendors of rods and other tackle. Barracuda, owing to their great speed, break up as much gear as heavier fish.

Yellowtail fishing is the best sport that southern waters affords the sea-angler. The white sea-bass is too uncertain to consider very seriously, but that is its only drawback. It is a surface fighter rather than the dogged, deep-sounding, kelp-hunting "slugger" the yellowtail is. Both species take rank far ahead of the tuna in popularity because much more plentiful. Tuna fishing is a millionaire's game, but the yellowtail is for all, and is so plentiful that sport is reasonably certain. It is doubtful whether any fish of equal weight can put up a more determined resistance, or display more tricks.

For a time opposition was manifested by some of the southern California sea-anglers at the inclusion of these species in the list of game fish for which license is required; but as the idea spread that protecting these species adds materially to the cost of protective work, the sportsmanlike spirit of bearing one's fair proportion of costs has asserted itself so generally that now the license is collected from rod and reel clubmen and big fishermen generally just as freely as at first it was from the seekers after artificially propagated fish. Eventually the southern California patrol boat will be in use and closer attention will be paid to these marine features than has been possible thus far with the relatively slow and inefficient boats which the Commission has been

able to rent. Fish and Game Commissioner Connell, in charge of southern operations, has taken the position that, so far as possible, the various branches of the work should produce income, each sufficient to meet its needs; and that to divert moneys contributed by hunters to better sea-angling conditions is neither wise nor equitable. This view has been so generally approved by all sportsmen that it may be considered the law, for the principles of equity are deeply rooted in the minds of men who love to hunt and fish.

Among other things that 1916 has proved beyond question is the wisdom of the Commission's plans for a big southern California hatchery in the Owens Valley. Commissioner Connell has devoted more time to the future interests of the state in this matter alone than to the entire detail of his private business for six months past. He has felt that the time is here for something of a permanent nature calculated to put the enterprise of raising fish against future sporting demands upon a sound and enduring business basis. In its inception, the plan was looking fifty years ahead; but so far beyond even the most sanguine expectations has the interest in angling gone already this year that the farthest-sighted program possible today bids fair to prove short of the needs of even five years hence. The Oak Creek plan calls for a capacity of 6,000,000 fish annually, and there is a possibility of so utilizing the forty acres of the site that it may be increased beyond that capacity. Eventually it is certain this must be done. The Commissioners mutually exerted themselves in behalf of a speedy completion of the Oak Creek plant, but it is doubtful whether any fish can be handled there until next year. The plans call for a hatchery building of particularly pleasing aspect, harmonizing with the surrounding because built of stone taken from the site. Against the bold buttresses of the Sierras, its massive and fitting style of architecture will make it one of the state's show-places, particularly because the Eastern Sierra Highway passes within a few minutes' drive from it and the building, perched upon a commanding eminence overlooking the entire Owens Valley, is in plain view for forty miles.

The southern patrol force has been efficiently handled by Commissioner Connell and an effective plan of expansion based on temporary appointments of extra deputies has been worked out to meet the emergency demands of seasonal openings. Already a list of expert men, some of previous experience as peace officers, others as sportsmen, has been recorded. Because it is impossible even with the present increasing income of the Fish and Game Commission to cover the country constantly with a fully adequate force of men, the plan of meeting the emergencies coming at the opening of the trout season on May 1, the dove and deer season on September 1, and the general bird season on October 15, has been adopted. And should it seem justified, the extra men may be kept on duty a longer time, and they will thus stand an excellent chance of permanent appointment whenever the funds permit such increase. As the number of sportsmen increases, the liability of increased patrol duty is automatically forced upon the Commission and also the wherewithal to finance it in form of license-revenue. Thus the scheme is developing, by actual field training and education, a supply of future deputies fit to keep California far in advance of all states in

the Union in the businesslike conservation of her fish and game resources.

Already the policy of strict enforcement and of publicity and education has reflected itself in a notable growth of the law-abiding spirit. With over thirty men afield watching trout violations, very few license cases were brought, and few failed to carry their licenses with them, although the deputies turned in thousands of names of licensees examined and compelled—willingly enough in the main—to exhibit catches. The growth of favorable opinion was well summed up in the words of one licensee accosted on Bear Lake who produced his license with the words—"Sure thing; that's the cheapest thing I buy." They are realizing that the Fish and Game Commission is merely borrowing their dollars to return on demand at a most usurious rate of interest in bettering hunting and fishing conditions. In view of the great general good accomplished, very much less criticism of relatively unimportant or immaterial details is heard than even a year ago. Men are learning that the business of fish and game is a "big business," to be judged by general results, not immaterial trifles.

CALIFORNIA FISH AND GAME

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July 24, 1916.

God has lent us the earth for our life. It is a great entail. It belongs as much to those who are to come after us, and whose names are already written in the book of creation, as to us, and we have no right, by anything we do or neglect, to involve them in any unnecessary penalties, or to deprive them of the benefit which was in our power to bequeath.—Ruskin.

LOOK BEFORE YOU SHOOT.

We need but call the attention of our readers to the list of hunting accidents which appeared in the last number of CALIFORNIA FISH AND GAME (Volume 2, pp. 93-94) to bring home the need for following the motto, "Look before you shoot." With a little care the usual list of hunting accidents can be cut down to a minimum. The law definitely states that the only deer which may be killed during the open season are those having antlers. Not even spiked bucks are allowed to be taken. There is, therefore, little excuse for the man who mistakes a man for a deer. *Be sure you see the antlers before you shoot.*

DEER HUNTERS ATTENTION!

SAFETY FIRST!

HUNTERS' RULES.

1. Never crawl or creep.
2. Wear a conspicuous coat, hat, or hatband.
3. Be sure you see and know what you aim at.

Fig. 46. Columbian black-tailed deer.

THE EDUCATIONAL FUNCTION OF THE DEPUTY.

Although the detection of the violator forms an important aspect of the work of the deputy, his more positive and inclusive function is the guarding of the wild life resources of the state. To fulfil this function knowledge is all important. The deputy should therefore know all the various forms of wild life in his state and should be familiar with their life history and habits. The district in which he lives will depend upon him for information of this kind and the scientist will look to him for adding to the store of useful information on the occurrence of unusual species or extraordinary habits.

All information on the status and life history of the various species of wild life and on the work of the Fish and Game Commission should be sent by the deputy to the Bureau of Education, Publicity and Research, California Fish and Game Commission, Berkeley, Cal., where it will be properly utilized. Whenever possible, photographs and illustrative specimens should be collected as evidence. The publications of the Commission, which aim to record and disseminate the knowledge thus collected, should be kept constantly in mind and pertinent material should be sent for them. These publications are CALIFORNIA FISH AND GAME (quarterly), TEACHERS' AND FARMERS' BULLETINS (published at irregular intervals) and the BIENNIAL REPORT.

Accurate scientific data must always be the ground work for adequate legislation, and the contribution of such data by the deputy is an important phase of his work.

Another aspect of the educational function of the deputy is the spreading of the doctrine of wild life conservation. Emphasis should ever be laid upon methods of conservation rather than upon methods of destruction. The people in the district in which a deputy is at work should be kept informed as to the aims of the Fish and Game Commission and of the deputy's individual work. Every effort should be made to gain co-operation, not only to the end that game laws are enforced, but that wild life is properly conserved.

A person educated to the value of and the need for game conservation is a greater force in wild life protection than a violator brought to justice. The local newspapers are valuable mediums in developing proper sentiment as regards wild life and should be utilized continually. Organizations such as game protective associations, women's clubs and schools can be made valuable allies in constructive work along the lines of wild life conservation.

Nothing can be of more permanent value to the cause of wild life protection than a campaign of education conducted officially by the state department whose function it is to conserve the wild life resources.

VENISON CAN BE DISTINGUISHED FROM OTHER MEATS.

In past years the California Fish and Game Commission has often failed to convict violators of the deer laws when the evidence was in the form of dried or smoked meat and the identity of meat remained obscure or unknown. Provided the meat contained small bones or skin it could usually be identified, but otherwise no means was at hand for distinguishing whether or not it was venison. Through the co-operation of Professor F. P. Gay of the Department of Pathology of the University of California and Mr. Frank C. Clarke, formerly a member of the scientific staff of this Commission, a method has been worked out whereby, through the use of a precipitin test, venison can be distinguished from bear meat, mutton, beef, goat, or any other meats, no matter in what form it has been prepared. This method is the same as that employed in European countries in the diagnosis of meat and meat preparations where fraud is suspected.

The precipitin test is prepared in the following manner:

Antisera for venison is first prepared by injecting fresh serum from deer blood into rabbits by intravenous and by subcutaneous injections. These injections by each method, respectively, are given on three successive days with a three-day interval. The blood is then withdrawn antiseptically from the rabbits and a serum extracted. This precipitin, when placed with a weak extract made from deer flesh with sterile physiological normal salt solution, forms a cloudy precipitate, but when placed with an extract from the flesh of any other sort of animal, does not form a precipitate. This test

has been used in important cases in California and has been instrumental in convincing the jury that the meat in question was venison.

ADVANTAGES OF A BUCK LAW.

The following quotations from an article published in 1915 by Mr. John B. Burnham, president of the New York State League for the Protection of Fish and Game, appeared in a leaflet issued by the National Educators Conservation Society. They clearly point out the advantages to be derived from such a deer law as that possessed by the state of California:

"Insures 'perpetuation of a species which not only furnishes sport * * * but also provides a valuable food supply. The farmer sells his bull calves and wether lambs and saves the heifer calves and ewes, and similarly under a buck law the buck deer are killed and the does saved so that the future supply will be assured.'

"Prohibiting sales of game, reducing bag limits, and shortening open seasons are none of them as good as the present buck law. Short seasons mean overcrowding with hunters and grave danger to human life. 'With deer, the law protecting all animals except those bearing horns exactly meets the situation. Where such a law is in force a longer open season can be given with the resultant advantage of less crowding in the woods at any one time and a fair bag limit can be permitted without endangering the supply.'

"Protection of the does protects the fawns also. 'For two years, while the law permitting the killing by still-hunting of both bucks and does was in force, only one deer out of four shipped over the Adirondack division of the New York Central Railroad had horns; the others were does and fawns.'

"The buck law saves human life. In 1909–10 in five states without the buck law 40 lives were lost and over 100 wounded. In 1910–12 in nine states having the buck law NO lives were lost. 'Under the present buck law in New York state * * * there was no case during the last hunting season where anyone was killed by being mistaken for a deer. On the other hand, there were 24 deaths from hunting accidents in Wisconsin, a state having no buck law.'

"The law stands the test. Vermont has given the law the longest test. It is the only state in the Union today which complains with reason of too many deer.

"Buck-shooting requires true sportsmanlike skill. Hunting does is like shooting cows in a barnyard.

"Even the opponents of the buck law in New York admit the tremendous increase of deer which has occurred during the three years it has been in operation. Vermont would have no more deer today than it had in 1875 were it not for the protection of does. George Shiras, 3d, the famous big game hunter, photographer and naturalist, with the assistance of Dr. Fisher and Professor Beal of the Biological Survey at Washington, recently prepared a table which shows that with a buck law good shooting is afforded and the supply of deer increased under exactly similar conditions which spell extermination with the other law.

"For the purposes of the comparison it was assumed that a breeding stock of 24 bucks and 24 does, age two years, were available and that the increase annually thereafter was one and a half fawns per pair. The ratio would not of course be affected if a lesser or greater number were taken as the original stock or increase.

"Under the old law, assuming that 50 per cent of the deer were shot annually, extermination would result at the end of ten years, during which period 155 deer would have been killed.

"Under the same conditions, assuming that 50 per cent of bucks only were killed, at the end of the ten-year period 781 bucks would have been bagged and there would remain a breeding herd of 781 bucks and 1,562 does, or a total of 2,343 live deer in the woods. If 72 per cent of the bucks were killed the hunters would have secured 1,170 bucks and there would be left a breeding stock of 1,952 deer.

"'That there are more bucks in the forest for hunters to shoot shortly after the adoption of the new law,' says Mr. Shiras, 'than does and bucks combined under the other law, ought to satisfy even the selfish class who have no regard for the rights of future generations, or the efforts now being made to prevent the extermination of wild game.'"

THE ADVANTAGES OF A BUCK LAW, THEREFORE, ARE:

1. In successful operation today in a majority of the important deer-producing states.
2. Protects human lives.
3. Is based on common-sense breeding principles.
4. Increases the stock of deer wherever given a fair trial, as in the state of Vermont.

DEER DIE FROM PECULIAR DISEASE.

During July, 1911, deer began to die in southern Trinity County and the epidemic spread over the southern half of this county and passed into Humboldt and northern Mendocino counties. From descriptions and from evidence obtained this disease, at least as found in Trinity

County, was due to an infestation of bladder worms, which parasites developed on the intestines, liver, lungs, and other vitals of the deer.

Reports this last spring (1916) from two sections of the state indicate that hundreds of deer have again died from some peculiar disease. Deputy Perkins, of Fort Bragg, reported that a number of deer were found dead, presumably from disease, in the Point Arena section. Deputy G. O. Laws, of Weaverville, Trinity County, reported that conditions on and near a part of the Trinity Forest game refuge (district 26) were serious. Large numbers of deer were found dead. They were in fine condition and could not have died from starvation. Examination seemed to show that they had died of the same disease which attacked deer in Trinity and surrounding counties in 1911. A later report from Mr. Laws states that the disease spread over a large part of northern Trinity County, and was fatal to many deer. Mr. Jesse Smith, of Hawkin's Bar, states that he thinks fully one-half of the deer died in his section.

AT LEAST 12,000 DEER KILLED IN 1915.

On page 168 of this issue will be found a computation of the number of deer killed during the hunting season of 1915. Data on deer killed in the National Forests are obtained by forest rangers, and deputies of the Fish and Game Commission also make note of the deer killed in their respective districts. Where no actual records have been kept, a reliable estimate has been obtained from residents conversant with local conditions. These reports, although incomplete, afford a basis for an estimate as to the kill of deer each year. Records of this kind have been kept since 1911, during which year 6,489 were reported as killed. The total number reported in 1914 was 8,699, as compared with 8,343 for 1915. It seems possible that fewer hunters may have been in the field in 1915, thus causing a reduction in the number of deer reported as killed. The discrepancy may be due also to a greater degree of incompleteness in returns. The total kill for 1914 was estimated to be at least 12,000, and the figures of this year lead to a like estimate.

When segregated for each county the figures furnish interesting evidence as to the distribution of deer in this state, although in some cases large kills are indicative of concentrated hunting rather than of large deer population. If the actual figures are depended upon, Siskiyou County leads in the kill for 1915, with Monterey a close second. Trinity County, which headed the list for 1914, drops into third place. In southern California, Santa Barbara County alone shows a kill which compares favorably with northern counties.

Fig. 47. Anticipation and Realization. Black-tailed deer fawn being reared at the State Game Farm, Hayward, California.

The main object of this computation is the assembling of data which will lead to better administration of our deer supply. The factor most necessary in conserving the supply of wild life is the provision of a sufficient breeding stock. The computation of the toll taken each year leads to a knowledge of the needs of the species as regards breeding stock and thus allows a basis for proper legislative measures to meet the changing conditions from year to year. Up to this year the records have shown a steady increase in the number killed. Should a steady decrease now be shown from year to year, evidence will be at hand that the breeding stock is being impaired and steps will have to be taken to give deer better protection.

SALT LICKS FOR DEER.

Several seasons past it was reported by a forest ranger that in a certain district in the Trinity National Forest the cattle had monopolized the natural licks to a large extent and that the deer were hunting salt licks in the mud along the Trinity River. He recommended that salt be furnished for the deer in such localities. In order to try out this scheme experimentally, the Fish and Game Commission last spring furnished the forest service with twenty five-pound Leslie salt bricks, half of them equipped with hangers and the others without hangers. These were distributed to the district rangers to be used in suitable locations where frequent observations could be made by a forest officer. Eight bricks were furnished the Big Bar District and two were sent to each of the other districts. The results for the various districts as reported by Supervisor Coffman are as follows:

Big Bar District. District Ranger Brannan reports:

"On August 1, 1915, I shipped two salt bricks to Bert Higgins at the Keystone Ranger Station. They were placed on a deer crossing at the mouth of White's Creek. The deer seemed afraid of it. Guard Higgins made a solution of salt and sugar and rubbed it on the tree around the bricks. The deer licked the bark of the tree all smooth before the bricks were touched. From the first night on, two deer came until the sugar was gone. After the fifth night there were from two to ten until the salt was gone.

The salt places at Hebron and Digger Flat established about August 1st, were used very little up to November 20th.

On August 3d, I placed two bricks near the Waldorff Ranch. The first night only one track was noticed; second night there were more tracks and from the third night on, until the salt was gone, the ground was all torn up. The salt lasted only four weeks.

On August 8th, I placed two salt bricks on Don Juan Creek. There seemed to be only a few deer in that section. On the first night four deer found the salt and continued to use it or were still using it the last time I was there on October 20th."

Hayford District. District Ranger Everest writes:

"Guard Duncan placed one of these salt blocks in approximate Sec. 23, T. 30 N., R. 11 W. The other was placed by Guard Randolph in Sec. 19, T. 1 S., R. 8 E.

The blocks were in each case placed where deer were plentiful. They were examined several times during the season and both guards report that the deer have made absolutely no attempt to use them."

Mad River District. District Ranger Gray reports:

"Only one of the salt blocks forwarded to this district to be placed on the range for deer was placed this season. This block was placed near C. H. Matthews' cabin on the South Fork River, where a considerable number of deer are found, and which very few range stock frequent. Mr. Matthews advised me that he was interested in the matter, and if I would place the block in the vicinity of his home he would keep a careful record as desired by the Commission, this he has done. On or about August 1st, the block was placed at a point about 400 yards distant from Mr. Matthews' cabin near a large thicket of brush which many deer frequent. The block was attached to a large fir tree about three feet from the ground. All leaves and trash were removed from around the base of the tree so that tracks could be readily seen. Mr. Matthews visited the lick twice a week during the fall, or until he left the South Fork, which was about October 20th. He reports that deer approached within a few yards of the lick but none were known to have used it. Mr. Matthews will resume his observations about April 1, 1916."

Lower Trinity District. District Ranger Graham reports:

"I put the two cakes of salt out; one I put near the river below the Douglas Ranch and the other I put near the trail to the Four Mile Ranger Station. The deer immediately found them and they were eaten in less than a month from the time I put them out.

Deer in this locality are usually "salt hungry" during the summer and will travel a long distance to a salt lick, and no doubt a reasonable amount of salt

distributed on the ranges would be of benefit to them."

Sierra Fork District. District Ranger Chamberlain writes:

"I received two bricks of the salt referred to, one to hang on a tree, the other to be laid on the ground. I gave the one to be hung on a tree to Guard Mahoney and requested him to place it on Montgomery Ridge east of the Buckeye Ranger Station, and to visit it occasionally to see how much of it was used. Just before Mr Mahoney left the station, which was on September 30th, he stated that deer had not made use of the salt brick.

The brick to be laid on the ground I put on the top of Browns Mountain, just north of the wagon road between the Costa place and Eli Cambon's. I visited it quite often and as long as it stayed there it was not used. After about three and a half months it was missing. Someone evidently carried or threw it away.

I saw numerous fresh deer tracks and cattle tracks also, which showed that both deer and cattle had walked over the salt brick, and passed close by it; but as I stated before it was not used. I think the reason is this: Costa salts his cattle with ordinary cattle salt in his corral and in a gulch about one half mile north of the salt brick, and I think that both cattle and deer prefer the cattle salt. I have seen deer using the salt put out by Mr. Costa.

On Buckeye Mountain the sheep men put out salt for their sheep which the deer use in preference to the brick. And it may be that they are afraid of the brick salt, although I hardly think so."

No reports are at hand from the Hyampom and Yolo Bola Districts.

While the reports from three of the districts appear to indicate failure there, the results in the Big Bar and Lower Trinity districts are distinctly favorable, and if the Commission wishes to continue the use of salt for deer in these districts we will be very glad to distribute it and make further observations.

WAR TO BE WAGED ON ENGLISH SPARROW.

Sentiment against the European house sparrow, commonly called the English sparrow, has become so strong that the Fish and Game Commission has decided to carry on a publicity campaign which it is hoped will lead to a better control of the pest in California. A leaflet giving methods of identifying "English" sparrows and means of destroying them will soon be issued. In addition, a campaign of publicity will be undertaken to encourage a united effort to rid California of this bird pest. A week will be set aside during which everyone will be asked to co-operate in the destruction of sparrows, and all of the deputies of the Fish and Game Commission will be set to work killing sparrows and directing others in the work. As elsewhere, the European house sparrow is filthy in its habits, is destructive to crops, and in addition drives out native insectivorous birds which are beneficial to man's interests. There are few who will mourn if the "English" sparrow is lessened in numbers, and there are many who will greatly appreciate any effort to destroy these objectionable birds.

San Diego has already engaged in an active campaign against these birds. An ordinance appropriating $125 for sparrow destruction was passed on April 5, 1916. The task of destroying sparrows was given to one man who is to receive five cents apiece for all "English" sparrows killed. The campaign seems to have met with considerable success. Similar measures should be instituted in other cities of our state.

JUDGES GIVE SEVERE SENTENCES.

The judges of the state are taking more and more interest in enforcing the fish and game laws. During the past few months several heavy penalties have been exacted from violators. Since January 1st, eleven jail sentences have been imposed for various violations of the fish and game laws. Three of these sentences were for a period of 150 days, in two cases for killing does and in the third case for fishing with illegal nets. In two instances offenders were given no alternative to the jail sentences.

SNOW MOUNTAIN DAM HEARING.

A hearing was held by the Fish and Game Commission on April 1, 1916, at Upper Lake, Lake County, regarding conditions relating to trout and salmon at the Snow Mountain dam on the south fork of the Eel River.

The meeting planned by Mr. M. P. Benedict, supervisor of the California National Forest, was well attended, about sixty men were present, some of whom had come from Lakeport eleven miles distant. Mr. Benedict acted as chairman and brought out the following points as the main objects of complaint:

1. That, whereas fish were formerly very abundant in the upper part of the

South Fork of the Eel River, they are now few in number and little or no restocking of the streams has taken place since the Snow Mountain Dam was constructed and spawning operations begun.

2. That no large fish are to be found above the dam.

3. That in the spawning operations carried on at the Snow Mountain Hatchery many fish not used for spawning are prevented from reaching the upper part of the stream.

4. That the fish ladder does not appear to be adequate and that most of the fish are unable to reach the stream above (see Fig. 49).

After talks by the representatives of the Fish and Game Commission (N. B. Scofield, F. H. Shebley, and H. C. Bryant) the meeting was thrown open for a discussion of the points.

The meeting lasted for over two hours, at the end of which time the following resolutions were unanimously passed:

1. That the fish not used by the Commission for spawning purposes be allowed to pass into the stream above the dam instead of below, as has been done in the past.

2. That the Fish and Game Commission plant a large number of trout fry above the dam this coming season.

3. That it be the sentiment of the meeting that the fish and game laws of the state be observed and enforced.

4. That an investigation of the fish ladder be made to find out whether or not the fish are deterred by the ladder from passing up stream.

5. That special provision be made to see that the first run of steelhead trout be allowed to ascend the stream unmolested until spawning operations are begun.

It was clearly brought out in the discussion that the hatchery as at present operated is a detriment to the restocking of the stream above the dam, in that the fish not used for spawning purposes are liberated below the fish ladder and are unable to reach the upper stretches of the stream. An investigation of conditions at the dam, on April 2d, showed that with small expense the fish for spawning purposes could be taken from the fish ladder near the spawning house and, by means of a flume run to the fish ladder just above, those not used for spawning could be returned to such a point on the ladder that they could easily reach the stream above. The three representatives of the Commission unanimously recommended that such a change be immediately instituted.

Fig. 48. Snow Mountain Power Company's dam in Mendocino County.

Fig. 49. Fish ladder at Snow Mountain dam, Mendocino County. Investigation has shown that fish readily ascend this ladder.

WILD GAME AND ITS PRESERVATION.

Under the title "Wild Game and Its Preservation—A Correction of Some Popular Fallacies" the San Francisco *Examiner* has been running a series of articles attacking the State Fish and Game Commission and defending the market hunter. The author of the series is Mr. Fred S. Walker, of Los Banos, a former newspaperman. Mr. Walker contends, in the first place, that all of the waterfowl of the interior valleys are on the road to extinction, owing to reclamation projects. So long as they will soon be entirely exterminated, he says, let us make the best use of them possible at the present time. This use is, he points out, to place them on the market and to allow the market hunter free range even to the extent of dispensing with the limit law. Many of Mr. Walker's arguments are false and his statements inconsistent. As an example of his inconsistency the following conflicting statements may be noted. He writes: "The game of the valleys—irrespective of 'preservative' laws—is failed to become extinct. Its destiny is beyond the control of any Commission." In another paragraph we find: "As practically all our ducks and geese are bred in the isolated provinces of Canada, and their foraging is detrimental to the garden industry of this state, and as the shooting of a million birds here every year would not materially affect the supply, it would seem the part of wisdom to wipe out the fifty-a-week limit on these birds and to open up the markets of the state for their sale so that all might enjoy on their tables the flesh of wild life." If waterfowl are doomed to extinction in the interior valleys how can such an inexhaustible supply still be forthcoming as is suggested in the second sentence?

We need not give further comment to this series of articles. We are sure that no one will be hoodwinked into believing that our game should be slaughtered with no restriction simply because reclamation is fast reducing numbers. Nor do we believe that people will accept the derogatory statements against the Fish and Game Commission. The Commission is searching for methods of conserving wild life, not for methods of destroying it.

Fig. 50. Valley quail chicks at State Game Farm. Photograph by H. C. Bryant, May 29, 1916.

IS IT ANY WONDER?

The number of hunters is increasing from 5 to 10 per cent each year; facilities for getting to what were formerly inaccessible places have increased, it now being possible for a man with an automobile to go one hundred miles or more away from the railroad in a few hours' time; game country in which a gun was never heard a few years ago is now overrun with hunters; ranchers are crowding into all parts of the state and thus restricting the breeding ground of game; guns have been perfected so that now five shots can be fired into a flock of birds almost before they are aware of the presence of the hunter. Is it any wonder that game is diminishing in numbers? The wonder is that there is any left.

BOY SCOUT CO-OPERATION.

Arrangements have been completed whereby boy scouts in this state will take an active part in wild life conservation and act as aids to the Fish and Game Commission. The following statement was recently sent every scout master in California:

> The boy scout is in a position to aid materially in the enforcement of fish and game laws and in the care and conservation of wild life. On the other hand, work of this kind not only makes a scout a better citizen but it prepares him for the test for the merit badge in conservation, requirements Nos. 2, 4, and 6 specifying particularly this kind of work. Co-operation by boy scouts in the conservation of wild life in this state is therefore sought by the California Fish and Game Commission.
>
> Credit will be given boy scouts for the following types of work:
>
> 1. The dissemination of knowledge on the fish and game laws, the work of the California Fish and Game Commission, and on wild life conservation. (It would be of great aid to the Commission if boy scouts would always take the opportunity to inform campers, hunters, and others with whom they come in contact, of the fish and game laws, warn them of their liability for violation of these laws, and report all violations to the nearest game warden.)
>
> 2. The finding and reporting of wild game which has been injured or destroyed in numbers, either through natural or artificial means.
>
> 3. The systematic feeding of game during severe winters, or the encouragement of wild birds through feeding, the planting of cover, or the building of nest boxes.
>
> 4. The taking of a census of any one game species in a restricted area.
>
> 5. The destruction of predacious animals injurious to wild life or the destruction of that worst of bird pests, the European house sparrow, usually called English sparrow.
>
> In return for co-operation, the Commission will award a prize (or prizes if necessary) of a pair of golden pheasants to the boy scout who does the most co-operative work. Scouts wishing to qualify for this prize should report regularly on the work accomplished through their Scout Master to Dr. H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, California. A copy of the state fish and game laws is being sent you and other literature is available on request. If sufficient interest is shown in fish and game co-operative work, a merit badge will be offered by the Commission.

FISH AND GAME LECTURES GIVEN TO FORESTRY STUDENTS.

For the second time the Bureau of Education, Publicity, and Research of the California Fish and Game Commission has co-operated with the Forestry Department of the University of California by giving a series of lectures on fish and game. This year these lectures were given before a class in general forestry in which there were about 350 enrolled students. The following were the subjects and the speakers:

The geographical distribution of plants and animals in California ..... *Dr. J. Grinnell.*
Game and nongame birds of California ..... *Dr. H. C. Bryant*
The economic value of birds ..... *Dr. H. C. Bryant.*
Game and fur-bearing mammals of California ..... *Dr. H. C. Bryant.*
Mammals in their economic relations ..... *Mr. T. I. Storer.*

The food and game fishes of California ..... *Mr. N. B. Scofield.*
The past, present and future of game in California ..... *Dr. H. C. Bryant.*
The national forests and wild life ..... *Dr. H. C. Bryant.*
Methods of game conservation ..... *Dr. H. C. Bryant.*

WHY ANTELOPE DO NOT INCREASE.

The antelope is probably one of the game mammals which is so nearly extirpated that it will never again take a place among those animals hunted for food or sport. One of the fundamental reasons

Fig. 51. Deputies and assistants of San Francisco office attend lecture on conservation at University of California.

These lectures were designed to furnish a working knowledge of the common birds and mammals of the state with particular reference to important game species and to the problem of their conservation. The lectures were open to the general public and attracted many outsiders, and the last of the series was attended by ten deputies of the Fish and Game Commission (see Fig. 53).

FISH AND GAME EXHIBIT AT CHICO FAIR.

The Fish and Game Commission installed an exhibit at the fair held at Chico the last week in May. Ducks, pheasants and quail from the State Game Farm at Hayward were on display and aquaria contained black bass, blue-gill perch and redfish from the Sacramento River, many salmon fry, and rainbow, eastern brook, and Loch Leven trout. Methods used in hatching and rearing rainbow trout were demonstrated in a small hatchery. The publications of the commission were also prominently displayed. The exhibit proved to be one of the most attractive at the fair.

why antelope are decreasing rapidly in this state at the present time is that certain persons, either with malicious intent or because of lack of knowledge, take a toll from the small herds still existing. As evidence we call attention to the fact that Deputy G. W. Courtright recently reported that a dead male antelope had been found near Alturas, Modoc County, which had been shot by an unknown person. The animal was discovered by D. B. Henke, a government hunter. Evidence that it had been shot but a short time is shown by the fact that it was donated to a county hospital for food. Until people more carefully obey the state game laws there is little likelihood that antelope will increase in our state.

SEA LIONS TRIED AS CARP-KILLERS.

Under permit from Commissioner Conwell, Mr. Ira Eaton, of Santa Barbara, procured four adult and two baby sea lions in the Santa Barbara Channel. These were released in Guadalupe Lake on January 27, 1916. It was hoped that the sea lions would cause the destruction

of carp and thus better fishing conditions. On February 7, 1916, the two baby sea lions were killed by Italians living in the near vicinity, and about the same time the other four sea lions disappeared. It is supposed that they went to the ocean. Whether or not the sea lions destroyed large numbers of carp, as was expected, has not been ascertained.

THE SCIENTIFIC COLLECTOR.

The work being accomplished by the holder of a scientific collecting permit is not appreciated by many people of this state. Instead of encouraging the very work which brings the best returns so far as knowledge of bird life is concerned, there is a constant tendency to criticise and curtail this sort of work. No enduring facts regarding the status and habits of wild life can be obtained without the collection of specimens. The most dependable and recognized record of occurrence is always based on a bird in the hand, or, in other words, the scientific specimen.

The following defense of the scientific collector by Mr. Frank M. Chapman, curator of birds in the American Museum of Natural History, appeared in a recent review:

> "The editor, Mr. John Dryden Kuser, writes at length on the ethics of bird protection. He admits the right of the sportsman to kill birds for pleasure under 'a reasonable regulation of killing, so that it may be kept down to a basis where the game continues to be preserved and is not decreased,' but deplores the collecting of birds by amateurs for preservation and study. But has not the student equal rights with the sportsman and, pleasure aside, is it not more defensible to shoot a bird for the cabinet than for the table? Furthermore, since the student takes his toll from the entire avifauna rather than a very limited part of it, and his wants, once filled, are not recurrent with the opening of every shooting season, why is he not less destructive than the sportsman? We know of no instance in this country where the numbers of a species have been appreciably affected by purely amateur collecting; and where such collecting is done with a definite end in view, and not merely for the purpose of acquisition, it should be permitted by law. Indiscriminate collecting should be discouraged, not so much because of the birds taken—they will be preserved, not destroyed—but because, in the greater part of our country, it is a waste of time on the part of the collector. He can employ his opportunities for field work to much better advantage in studying birds rather than in shooting them."

Mr. P. A. Taverner of the Canadian Geological Survey takes a similar view of the scientific collector in the following:

> "The fear that the legitimate collector will deplete our bird life is groundless. Even were the number of our collectors increased many times and stimulated to greatly increased energy they would have a negligible effect. Large collections are sometimes pointed to as causes of a supposed reduction in bird life, but all the collections in North America, the results of fifty years' industrious work, would not nearly equal the destruction caused in one year by millinery plumage hunters. When we consider the constant, widespread persecution and the number of widely distributed sportsmen it has taken to reduce our game birds, it is obvious that a few scattered collectors can have little, if any, influence upon the bird population."

Of course, the collector must be reliable, for he is granted a privilege with the understanding that he is to benefit society by increasing scientific knowledge. He is, therefore, expected to preserve properly and care for each specimen and in the end see that his collection is so disposed that it will be of most service to the state.

SUGGESTIONS FOR ORNITHOLOGICAL WORK.

Many people interested in bird life are anxious to make a study that will be worth while. An outline which can be followed by both the amateur and the trained ornithologist, and one which will lead to a comprehensive knowledge of the life history of a bird, is given herewith. This valuable outline appeared in an article by P. A. Taverner, of the Canadian Geological Survey, entitled "Suggestions for ornithological work in Canada" (*Ottawa Naturalist*, vol. 29, April, May, 1915, pp. 14–18, 21–28).

> "Ornithology can be approached and studied from various sides and by individuals of many different tastes and inclinations. For the general nature lover, interested in birds from a poetic or esthetic standpoint, the study of life-histories offers a most attractive field. Careful watching and observing of feathered friends in their secluded haunts, bloodlessly stalking them with

camera and note or sketch-book and divining the hidden secrets of their lives is a pleasure that can be indulged in by all and enjoyed by many. The most common bird of our vicinity is an object worthy of the most careful and painstaking attention. The wren building in the improvised nesting box in the garden, the song sparrow of the near-by thicket are both awaiting a careful record of the story of their daily lives. The amount of original, valuable and interesting information that can be gathered from such home-like sources is almost infinite and unexpected surprises will almost daily

ment produce a periodical desire to migrate

"Which individuals come or leave first, male or female, young or old?

"Are they mated when they arrive or do they select mates after arrival?

"Are there any courtship ceremonies?

"What characters seem to determine sexual selection? Vigor? Beauty? Song?

"Do the same individuals return year after year to the same localities, and do they mate together annually?

"How wide is the local range of the individual? Do they keep close to this home area or wander widely?

Fig. 52. Mallard duck on nest at State Game Farm, May, 1916. More than 20 mallards have nested at the farm during the past spring.

repay the close observer. To those whose time and opportunities are limited such birds about home are fruitful. By those with more leisure, greater isolation or simpler opportunities, work farther afield may be pursued and species less commonplace can be studied. In fact there is work in this line for everybody of widely divergent taste and situation and even city parks and backyard gardens will amply repay attention.

"As a suggestion for investigation, the following outline of problems to be solved may be followed. It is merely suggestive and can be enlarged indefinitely.

"Is the species a resident or a migrant?

"When does it arrive and leave?

"What are the determining influences upon its migrations—food supply, weather, or does physiological development

"When, where, and how do they nest?

"Which sex chooses the site?

"Which sex builds the nest and how much and in what way do they aid each other?

"What seem to be the qualities that they look for in selecting a nesting site?

"Do they work on the construction throughout the day or only at regular intervals?

"What is the technic of nest building?

"Is the technic the result of instinct, experience or memory, and does it improve with experience?

"Are all individuals of the species equally expert in nest building?

"How far can they adjust nest to new materials, situations or conditions?

"Is there any change in the routine habits before, during or after nest building?

"Are the eggs deposited immediately after the nest is finished?

"What is the incubation period?

"How many eggs are laid and when, how often, what is a normal set?

"Does the egg laying seem under the conscious control of the individual?

"What determines the number of eggs—the size of the nest, the judgment, age or vigor of individual?

"How are the eggs brooded, by which sex? Do they divide the labor? Are the feathers removed from the abdomen of the brooding bird consciously or do they wear off by friction with the eggs? What is the incubation temperature? How often are the eggs turned by the parent?

"How are the eggs protected during exceptionally inclement weather?

ATTRACTING BIRDS.

Bird lovers throughout the land are seeking ways and means of increasing the number of birds and of attracting them to the vicinity of homes. While the basis for this movement is in part esthetic, to no small degree such efforts are based on a growing appreciation of the usefulness of birds as insect destroyers. The increase of interest in wild birds throughout the United States during the past decade has been phenomenal, and organizations having for their chief object the care and protection of birds are numbered by hundreds, if not thousands. Civic leagues and women's clubs have been especially active in attempts to attract birds to city parks and suburbs, with a view to bringing wild life to the doors of those denied the privilege of knowing it in wilder districts. Two publications issued during the year designed to aid and advance this movement—"Bird Houses and How to Build Them" and "How to Attract Birds in Northeastern United States"—constitute manuals on the means of attracting birds and fill a widespread and continually growing demand. The bulletin discussing methods of attracting birds is the first of a series planned to cover all sections of the United States. Special attention is given to the kinds of fruit-bearing shrubs and trees important as furnishing food for birds.—*Report of Chief of Bureau of Biological Survey, 1915, p. 6.*

THE DOMESTIC CAT.

Mr. Edward Howe Forbush, State Ornithologist of Massachusetts, has just published a bulletin of 112 pages (State Bd. of Agric., Economic Biology Bull. No. 2) dealing with the cat as a bird killer, mouser, and destroyer of wild life, and with the means at hand of utilizing and controlling it. After a discussion of the history and habits of the cat much evidence is adduced to prove that it is an active and intelligent bird catcher. Not only does the cat destroy song birds, but also many game birds, such as ruffed grouse, pheasants, partridges, snipe and woodcock. Evidence as to the value of the cat as a destroyer of rats and mice and other vermin shows that its utility in this respect is overrated. The bulletin ends with a discussion of the cat as a disseminator of disease, in which the statement is made that reports from correspondents apparently show that seventeen diseases are disseminated by cats, chief of which are smallpox, scarlet fever, ringworm, and serious infections resulting from the bites and scratches of a cat.

As a means of controlling the cat it is suggested that ownerless cats should be eliminated and owned cats confined like other domestic animals or limited in their movements to buildings or enclosures of their owners, and also that cats be licensed.

"The claims of the cat to a place in our domestic life rest primarily on the fact that it is supposed to do for us, with little conscious effort on our part, the onerous, petty and disagreeable task of destroying small rodents which for centuries have elected to fasten themselves as parasites on civilization. Inasmuch as the creature fails in this, in so far as it destroys other more useful or nobler forms of life, in such measure it becomes an evil and a pest. It will become an influence for good or ill according as we mould it, restrain it and limit its activities. It is our duty to check, with a firm hand, its undue increase in domestication, and to eliminate the vagrant or feral cat as we would a wolf."

THE BREEDING AND SHOOTING OF THE AMERICAN PHEASANT.

A comprehensive book on the breeding and shooting of the American pheasant has been published under the authorship of Mr. E. A. Quarles, Director of the Department of Game Breeding and Preserving of the American Game Protective Association. This work, which was originally intended as a pamphlet on the breeding of the ring-necked pheasant, was finally enlarged to a book of 136 pages, illustrated with 50 half-tones. In the preface emphasis is placed upon the fact that overdraw from club and private preserves invariably results in the stocking of public covers in the neighborhood, so that the organization of clubs for pheasant shooting is of considerable value. Mr. Quarles also advocates, as does the Commission on Fisheries and Game of Massachusetts, encouraging the small breeder rather than wholesale production, since the number of persons who can rear pheasants by the thousands is limited compared with those who are able to rear a small number.

Full directions are given as to how ring-necked pheasants may be bred in captivity and how the young may be successfully reared. A chapter then follows on disease and its prevention and one on combating vermin. Other chapters deal with the rearing of fancy breeds of pheasants, the marketing of the pheasant, the use of pheasants for sport, and how a pheasant is prepared for the table.

To pheasant breeders throughout the United States this work will form an important handbook, for it is without doubt the most comprehensive book yet issued on the subject. It can be obtained, bound in cloth, for thirty-five cents by addressing the American Game Protective Association, 233 Broadway, New York City. This book, in connection with the pamphlets cited previously in these pages (Volume I, pages 225-226) will furnish all the information necessary to the person who contemplates breeding game in captivity.

A GREAT WORK ON PHEASANTS.

The pheasants of all the world are to be glorified in what is considered the finest and costliest publication on a group of birds ever prepared. The first volume is to appear this year, according to the announcement made at the annual meeting of the board of managers of the New York Zoological Society, which has the work in charge. The price will be $250 for a set of four volumes, and the edition will be limited to 500 sets. The returns from sales will cover only a fraction of publication cost. Colonel Anthony R. Kuser, of New Jersey, a member of the executive committee, contributed $100,000 to defray the expense of gathering the material and preparing the elaborate color plates and publishing the work. He stands ready to make good any deficit.

Colonel Kuser is an enthusiastic pheasant breeder, and on his estate near Bernardsville, N. J., has many rare fowls, gathered from all quarters of the globe. The material for this remarkable work has been assembled in the last four years by C. William Beebe, the Zoological Society's curator of birds. Specimens were obtained by expeditions into the Orient—India, Ceylon, the Malay Peninsula, Borneo, Siam, and China, and many other places far from the beaten tracks. The illustrations in color were made by English artists, who excel in that field. The plates, made in London, have been praised for their artistic beauty as well as their scientific accuracy.—*American Game Protective Association Bulletin*, February 15, 1916.

TO THE SPORTSMEN OF CALIFORNIA.

Do you know that there is more typhoid fever contracted from outings in the great out-of-doors than in every-day living?

Do you know that at least 4 per cent of those who recover from typhoid fever retain the germs within their bodies for long periods, sometimes through life, though apparently in good health, and thus are "carriers" of the disease?

Do you know that the body wastes from such a person, if deposited in the stream from which you drink, even many miles upstream, may contain enough virile typhoid germs to pollute a stream as large as the Truckee River to such an extent that every glassful will contain at least one typhoid bacillus?

Will you, therefore, make it your particular business to help prevent pollution

of California's streams by repairing for the purpose of waste ejection to a spot so removed from the stream that by no chance can the refuse flow or be flushed into the stream? You can render a great service to the people of the state if you observe this simple rule.

For your own health it is better to carry good drinking water than to drink from any stream whose watershed is inhabited. If it is necessary to drink such water, first boil it.

And for the sake of preserving the beauty of the mountains will you: LEAVE YOUR CAMP AS YOU WOULD LIKE TO FIND IT. BURN OR BURY ALL REFUSE. KEEP THE PLEASURE GROUNDS OF AMERICA CLEAN.

CALIFORNIA STATE BOARD OF HEALTH.

HATCHERY AND FISHERY NOTES.

OPERATIONS OF THE DEPARTMENT OF FISH CULTURE.

The egg collecting season for trout is practically over for this season. The take of eggs of the different varieties is as follows:

Steelhead trout	6,100,000
Rainbow trout	2,500,000
Loch Leven trout	1,725,000
Eastern brook trout	2,275,000
German brown trout	90,000
Black spotted trout	3,325,000
Total	16,015,000

Owing to severe weather conditions on the Klamath River, the take of rainbow eggs will be considerably less than last season. The extremely high water during the early part of the spawning season interfered with the run of fish into the streams where the egg collecting stations are located, and later in the season the long continued cold, clear weather caused the trout to remain in the river and not ascend the spawning streams tributary to the main river as they usually do in normal seasons when the warm rains cause the trout to seek their spawning beds far up the streams.

Owing to the long continued drought on the coast streams the take of steelhead eggs will fall a little short of last season, but as the streams of California were so heavily stocked last season, we have ample fry on hand to give the streams a liberal supply. The applicants in California receive more fish in proportion to the size of the streams than in any other state in the Union.

Next season the Kearsage Hatchery and the Rae Lake egg collecting stations will be in full operation, and we expect to add several million more eggs to the already large annual supply. Several new stations are being planned by the Department of Fish Culture, to be ready for next year's work. Particular attention will be given to the propagation of the rainbow trout for the Sierra streams and an increase of steelhead for the coast waters.

The Fort Seward Hatchery was completed during the fore part of April, and on April 19th the first shipment of steelhead trout eggs was put in the building. At the present time there are one million steelhead eggs at this station and we are contemplating shipping a few more in the near future.

The distribution of salmon fry was finished on May 1st. The total number distributed was as follows:

Klamath River and tributaries	6,853,000
Sacramento River tributaries near Simon Hatchery	8,078,000

Three million salmon fry will be held in the ponds at Sisson to be reared and distributed in the Klamath and Sacramento rivers during the fall, before the flood season in the rivers. One hundred thousand salmon fry will be planted during the season in the Ventura River.—W. H. SHEBLEY.

GOOSE-NECK BARNACLES.

One of the crustaceans which has heretofore been given very little, if any, credit for its excellent food value, is the goose-neck barnacle. There are probably a great many people who know these little animals only as peculiar objects commonly seen sticking on the rocks along the rocky portions of the coast, and never once realize that they are very fine to eat. This species of barnacle, when properly prepared, is found to taste very

much like lobster and is equally as good to eat. It has recently become commercially valuable, and many are being shipped from Monterey each month to San Francisco markets.

They are prepared as follows: Take barnacle in shell and wash thoroughly clean with small brush, then put in colander to dry. Boil in strong salt water until the barnacles shrink free from the shell, and then remove the heavy skin from the necks. The barnacles may then be prepared as salad or in various other ways.

To make "barnacle bramble," season with butter, a little parsley and a pinch of garlic; cover and steam for a few minutes, then add lime or lemon juice and serve on hot plate.

DISTRIBUTION OF FOOD FISHES AND MOLLUSKS TO BE STUDIED.

Carl L. Hubbs, of Stanford University, is devoting the summer to a biological survey of the California coast from Monterey to the Mexican line. He will make collections of the lower forms of marine animals for the California Academy of Sciences, and of fresh and salt water fish for Stanford University. He will devote especial attention to the little explored coast between Monterey and San Luis Obispo and to a study of the transition forms of marine fishes in the neighborhood of Point Conception.

Mr. Hubbs will also do some special work for the California Fish and Game Commission, in relation to the distribution of food fishes and edible mollusks.

Fig. 53. Trout spawning. The female can be seen at the left digging up the sand preparatory to depositing eggs. The male is shown at the right. Photograph by J. H. Gyger, taken on Orchard Creek, San Bernardino Mountains, April 25, 1916.

FLOUNDERS EAT CLAM NECKS.

Mr. M. L. Clark, on being informed by the Chinese clam diggers on Tomales Bay that the California flounder puts in its time eating the necks off the soft-shell mud clams, decided to investigate for himself. He captured several in a beach seine and found them gorged with clam necks. The Chinamen explained that if only the tip of the neck is bitten off the clam does not die, but if it happens to be bitten a second time it can not recover. Thus is added another to the list of the clam's enemies on which the sting-ray and the wild duck have respectively held first and second place.

SHAD TO BE PROPAGATED IN CALIFORNIA.

Owing to increased interest in the shad as a food fish attempts will this year be made to propagate this fish artificially. The movements of the spawning fish are being carefully studied, and an experimental station has been established on the Feather River near Yuba City. Here an attempt will be made to collect shad eggs for shipment to Massachusetts and Connecticut, and a number of eggs will be hatched and the fish reared for planting in California streams. If the experiment is a success, it is planned to propagate shad on an extensive scale. It is hoped that by this means the shad run will be increased and a depletion, such as has taken place in eastern states, will be avoided.—W. H. Shebley.

Fig 54. Fishermen's wharf at San Pedro, Los Angeles County, California.

THE FIRST SHAD TAKEN IN THE COLUMBIA.

I had the honor in 1880 to secure the first shad taken in the Columbia River, at Astoria. I sent it to the Smithsonian Institution. It is interesting to know that there are now more shad on this coast than on the other and that we are sending the eggs back.

On page 109 (California Fish and Game, Vol. 21, I was "The American bird protector" in question. An old pirate died in England leaving the boast that he had in his lifetime trapped 400,000 skylarks and sold them mostly in the London market for a penny apiece. I noticed that the markets in Vienna, Genoa, and the South of France had great numbers of thrushes, bullfinches and other singing birds. I made a protest to Professor Paul Sarrazin at Basel, the chairman of our International Wild Life Protection Committee. He said that strenuous laws had been passed in Switzerland, but in the Italian canton Ticino they had never been able to get them enforced. It is very difficult to bring the Mediterranean people to conceive that the song birds in the winter are their guests and that they have a value to the world far greater than that of the little lump of food which each one can produce. I suppose that nearly all of the people arrested for killing song birds are those who have inherited this evil habit.—David Starr Jordan.

SALMON TO BE TAGGED IN MONTEREY BAY.

Salmon appear in large numbers in Monterey Bay one or two months before the summer or fall run appears in the Sacramento and San Joaquin rivers, and it has always been believed that these salmon in Monterey Bay are Sacramento and San Joaquin River salmon on their way to those rivers to spawn. Each year the fishermen who have had experience on the northern rivers claim that they can distinguish Eel River salmon, Klamath River salmon, and even Columbia River salmon among those caught in Monterey Bay. For the purpose of determining whether there are salmon other than Sacramento and San Joaquin salmon in the bay, the Fish and Game Commission has undertaken to tag a number of these fish and see if they are recaptured in other rivers than the Sacramento and San Joaquin. The quinnat salmon does not enter any of the streams to the south of Monterey Bay, but we know that they move down the coast often as far as Santa Barbara. Since the salmon travels this distance from the parent stream, it would not be very remarkable to find Columbia River salmon in Monterey Bay. The tags, which are very light, will be wired to the dorsal fin. Each tag is stamped with a serial number. The tags are made of silver because this metal best withstands the action of the sea water. We look forward with a great deal of interest to the results of this experiment.

Salmon are taken in large numbers in the sea near Fort Bragg, Mendocino County, and the Commission expects to conduct similar tagging experiments at that place.

Fig. 55. Rock cod fishermen, at San Francisco, baiting and coiling their lines in baskets.

FISH CANNERY STATISTICS.

The following table gives the number of cases of fish canned in California in 1915:

Kind	1-lb cans	½-lb cans	¼-lb cans
Tuna	136,816	172,365	31,977
Sardines	45,378	488	———
Salmon	17,143	3,520	———
Abalone	4,756	4,384	———
Shrimp	117	3,477	———
Yellowtail	485	1,949	56
Mixed	3,000	———	———
Mixed two	4,000	———	———
Boneless	12	317	———

The value of cannery buildings and equipment, exclusive of boats and nets, was $875,000; the number of people employed in canneries during the season was 1,950.

MONTEREY FISHERY NOTES.

During the spring the various packers and fresh fish dealers have shown great activity in the building and installing of new equipment at Monterey and New Monterey. Between 25,000 and 30,000 dollars have been expended by the packers and wholesale dealers in this district. The P. E. Booth Company has expended $9,000 for the addition to their plant of a new dock, salmon splitting house, and for machinery and equipment. Mr. K. Hovden is just finishing his new plant at New Monterey, which will cost, when completed, nearly $8,000. Mr. Ben Sonderman, of the Pacific Fish Company's plant at New Monterey, has installed new machinery and made changes to the extent of $4,000. The San Francisco International Fish Company of San Francisco have put up a $3,000 building on the Monterey city wharf. A. Napoli, a wholesale dealer, has put up a new collecting and shipping house on the city dock at a cost of $1,000. Vito Bruno, who has been operating in the Western Fish Company's plant, has plans for a $1,500 fish house on the city wharf. Mr. Joseph Rodriquez, recently from Spain, is building a small plant at New Monterey, where he intends to put out a new product consisting of pickled, pressed sardines in small barrels weighing about 35 pounds each. Mr. Rodriquez is planning to make his own barrels. The plant, when finished, will cost in the neighborhood of $1,000.

The salmon catch at Monterey is increasing each year and promises this year to be greater than ever before. Up to May 25th, the catch far exceeded the total to the end of June of last year. The catch at the end of May exceeded the entire catch of many former years; and June, July and August have been considered the best months. The largest day's catch was on May 14th, when 85 tons were taken. This, we think, is the record catch for a single day at Monterey. The run is earlier this year than usual, and the fish are therefore smaller. The average size is a little over 12 pounds, but in June and July the fish will run larger, for they will be older and will have had more time to grow. Some very fine, large fish have, however, been taken, and very few fish have weighed less than five pounds.

About 400 fishermen are engaged in fishing for the cannery and fresh markets at Monterey. It is expected that this number will be increased later in the season. The price of the round fish delivered at the dock is four cents per pound. The larger fish are being mild cured; the smaller are canned or sent to the fresh market. The wholesale price of the fish, cleaned, iced and boxed, f. o. b. Monterey, is six and one-half cents per pound.

NEW FISHERY PLANT AT MONTEREY.

Mr. K. Hovden is just finishing his new plant at New Monterey and expects to be ready to operate on sardines and anchovies just as soon as they start to run into the bay in sufficient numbers. This may be at any time about the first of June. Mr. Hovden proposes to utilize anchovies and smaller sardines, which at present are not utilized here to any extent. He says that these small sardines, when intelligently packed, will compete favorably with most European sardines in flavor, quality and price. This company will pack the sardines in the regulation sardine cans, and have the fish look and taste like the European variety. They will make no use of spices and other condiments.

The K. Hovden Company will also put up anchovies in two different styles: as a spiced fish and in a style similar to the Holland sardellen. They claim that their product will equal or excel the anchovies imported from Norway. Mr. Hovden, who has owned and operated plants in Norway, and is an expert in the preparation of fishery products, has done considerable experimenting in preparing sardines and anchovies, as well as several other species of fish, and when he gets his new plant into operation we will expect to see some new and delicious California fishery products.

MENDOCINO FISHERIES.

The salmon run along the Mendocino coast, which has been exploited by local and Sausalito fishermen during the last two or three years, promises to develop to such an extent that, within a few years, it may outrank other industries in Mendocino County. It is possible that the salmon run along the Mendocino coast

during the months of June, July and August will equal the run at Monterey, where there are between 400 and 500 fishermen employed each year to catch salmon for the various packers there established. There should be better harbor equipment at the mouth of the Noyo River. A fisherman's wharf, similar to the piers at Santa Cruz and Capitola, where boats could be hauled up for repairs and during bad weather, should be built. There should also be better facilities for transporting fish from the fishing

FLOODS DESTROY FISH.

The floods of the past rainy season were in some places so severe as to cause great injury to fish in the streams and even to the shellfish in the sea. In Southern California young trout were washed from the streams by the unusually heavy run-off. According to experts from the Scripps Institution for Biological Research, the water in the sea became exceedingly fresh from San Diego to Point Conception. This fresh water could be detected twenty miles from shore and to

Fig. 56. Roof of Quan Chong Lung Company, San Francisco, showing sole and kingfish. Among these fish were 180 pounds of striped bass, which were confiscated. Photograph by J. W. Gallaway, September 30, 1915.

boats to the train at Fort Bragg. If these accommodations for fishermen were available at the Noyo, there would be more fishermen and better boats. Aside from the advantage derived from the commercial fisheries in Mendocino County, better boats and harbor facilities would add to the attractiveness of this vicinity as a boating and pleasure fishing resort.

The rockfish and halibut fisheries along this section of the coast have hardly been touched. This sort of fishing would employ a great many fishermen the year round, with the exception of a few months during the winter.

Abalones and mussels are also abundant along the Mendocino coast and should be utilized. Some of the largest and best food mussels are taken in Mendocino County.

a depth of twenty fathoms near shore. This excess of fresh water killed great numbers of spiny lobsters, destroyed abalones and mussels, and injured the clam beds. Most of the mollusks in Mission Bay were killed and washed to near the entrance, where they have formed a great bar of shells. The effect of the excess of fresh water on the spiny lobster (crawfish) fishery promises to be great, although it appears that most of the older lobsters were able to escape or were better able to stand the fresh water, and only a few were killed.

Heavy rains of the past winter, falling on hills which lack a proper cover, because of heavy cutting, fires, cultivation or over-pasturing, caused rapid surface run-off and erosion. The water carries with it sediment, organic litter, and leaf

mold which is deposited in lakes or in the deeper portions of the streams. Here it decomposes later in the summer, when the streams become low and the temperature of the water becomes higher. This decomposition exhausts the free oxygen of the water, upon which the fish depend, and releases sulphur dioxide gas, which, when excessive, is deadly to fish.

Many of the streams are unusually low for this time of the year, and we can expect the loss of fish in the lakes and ponds and in the lower courses of the streams to be unusually heavy this summer.

BLACK BASS AT SAN DIEGO.

When the Sweetwater dam near San Diego broke during the month of February, the black bass which inhabited the reservoir were carried into the lower end of San Diego Bay by the rushing water. Although the bass are fresh water fish they made themselves at home in the bay, for the water at the time was perfectly fresh. As the stream gradually ceases to flow during this summer, the water in the bay will become more and more salt and those interested in the ways of black bass are speculating on whether these bass will, during this gradual change from fresh to salt water, become accustomed to the sea and continue to live in the bay.

COMMERCIAL FISHERY STATISTICS.

On page 166 will be found a table showing the amounts of fish handled in the state during the first quarter of 1916. These figures vividly point out the value of the fishery products of California. Even though the totals are large, we are only utilizing but a portion of our fishery resources.

SELECTION OF SHELLFISH.

Care should be used in preparing shellfish to discard all those with broken shells and also those which have become too weak to close their shells. Dead or nearly dead shellfish may, through putrification, develop ptomaines that are poisonous. In no case use a crab leg which has a crushed segment or a lobster with a broken shell. If care is used in selecting only the live and strong shellfish there need be no fear of ptomaine poisoning.

A GOOD SALMON CONSERVATION MEASURE.

Netting of salmon was formerly allowed at any place on the Sacramento River, but the last legislature passed laws which prohibit all netting above Vina; and in the river between Vina and Colusa, which is district 12a, it is not permissible to take salmon with nets between May 15 and December 31. It is believed that this is one of the best salmon conservation measures which has been passed in years. The salmon of the spring run ascend the river much farther than the fish of the fall run and they deposit their eggs in the headwaters where the streams are small and where the eggs or the resulting young are in much less danger of being destroyed by floods. The young which hatch from the eggs of the spring run are nearly all large enough to take good care of themselves before the winter floods arrive. The small streams in which they spend their early life are less subject to flood and the fry are therefore able to remain until they have reached a good size. Theoretically, they should have a better chance to reach the sea and attain maturity than the fry from eggs deposited by the salmon of the fall run. The fall run has been protected for many years by a closed season beginning in September, but not until now has the spring run received any such protection. In no salmon river are nets allowed so far up stream as in the Sacramento. Haul seines are laid out in the deep water in the bends of the upper river and hauled on the bar on the inside of the curve, sweeping the holes clean of salmon. With these nets on every available seining bar from Colusa to Redding, practically taking the fish off the spawning beds, it is a wonder we have any salmon left. These haul seines operate principally on the spring run salmon and are more successful than the nets on the lower river. The spring run has been poor for the last eight years, and this year it has been the poorest yet. With the upper river closed to salmon nets on May 15th (although that date is not early enough), more salmon should now reach the spawning grounds and the spawn-taking station at Baird. We look forward to an increased yield of salmon as a result of this protective measure.

STING-RAYS DESTROYED.

Sting-rays during March and April move into the shallow water of the bays where they remain during the summer. They are especially abundant in Tomales Bay and here cause great damage to the clam and oyster beds. The clam and oyster companies at Bivalve have been seining the sting-ray in an effort to get rid of them. So far no use is being made of these fish for fertilizer or chicken feed, for they can not be profitably transported to a reduction plant, since the nearest plant is on San Francisco Bay, and $3.00 a ton is the price usually paid for sting-rays.

CONSERVATION IN OTHER STATES.

A NEW CONSERVATION SOCIETY.

The National Educators Conservation Society has been organized to promote the active protection and increase of wild life and forests through the professional educators of America. Such noted educators as Elmer E. Brown, President of New York University, John Grier Hibben, President of Princeton University, and George E. Vincent, President of the University of Minnesota, are honorary vice presidents and the active officers and directors are all professional educators. A leaflet just issued gives the purpose of the society as follows:

"The National Educators Conservation Society was founded to train the children of this great country to a realization of the necessity for efficient protection of the wild life and forests of the United States. Through its teachings it aims to develop in the youth of the country such an understanding of the reasons underlying sound conservation laws as will make of these youths when grown to manhood a vital force in the enactment and defense of country-wide laws for the preservation of true sportsmanship and efficient game control.

"In the propagation of its teachings the Association depends upon the citation of laws that have been enacted by wise legislators to the desired end and per contra upon the disastrous effects of laws or lack of laws which through legislative ignorance or indifference permit the destruction and extinction of desirable forms of game.

"The following are the lines of activity in which the society is engaging:

(*a*) Secure perpetual close seasons for all species of wild life that are threatened with extinction.

(*b*) Stop all killing of insectivorous birds for food, and all birds for millinery purposes.

(*c*) Stop the sale of wild game.

(*d*) Increase the number of game preserves.

(*e*) Promote laws to prevent unnaturalized aliens from owning or using rifles and shotguns.

(*f*) Stop all spring and late winter shooting.

(*g*) Oppose the use of all extra deadly automatic, autoloading and "pump" guns in hunting, and secure the passage of laws against them.

(*h*) Preserve all forests from wasteful and destructive lumbering and forest fires; and reforest all denuded areas in state and national forests.

(*i*) Protect all harmless flowering plants threatened with extermination."

SPORTSMEN'S ORGANIZATIONS IN MASSACHUSETTS.

At the present time there are about 140 sportsmen's associations in the state of Massachusetts, running in membership from 20 to 1,800. These associations are not only factors in assisting in the proper distribution of the stock which the Fish and Game Commission is able to supply, but they serve as clearing houses for ideas and for crystalizing local sentiment on fish and game matters. They have great educational value and are more and more assisting in the solution of the problems which confront the landowner on the one hand and the sportsman on the other. Through these associations the rights of the landowner are becoming more and more recognized, and a spirit of co-operation is developing which will eventually result in the elimination, or, in any event, in the control of the hunter or fisherman who ignores the property rights of the man who owns the land.

THE RING-NECKED PHEASANT IN UTAH.

The ring-necked pheasant is increasing in Utah. From an original plant of fifty the birds have increased to such an extent that about five thousand are now to be found in Utah County alone. Careful protection has been given the birds, the fines ranging from seventy-five to one hundred twenty-five dollars for the killing of a single bird.—E. C. Borchers.

BIRD SANCTUARIES IN ILLINOIS.

According to the Game and Fish Commission of Illinois, the system of game reservations and non-game bird sanctuaries adopted by the state of Illinois differs in many essential features from the plans for game conservation and propagation of other states. The Illinois plan keeps close to nature and avoids as far as possible expensive artificiality. Instead of a few large tracts of land maintained at great cost, Illinois will have many small tracts of leased land that may be successfully maintained at a more nominal cost. According to plans already made it is expected that Illinois will have about one hundred game reservations and non-game bird sanctuaries that may be maintained for about five thousand dollars a year—less than one-half of the cost of maintaining a single game farm of any considerable size.

The Illinois plan is to lease a tract of land of from one thousand to five thousand acres, paying for each parcel that goes to make up the tract, one dollar per year. On each reservation something like five acres of land is planted in wheat, barley, buckwheat, or other grain which grows to a similar height. In these patches there is planted some sorghum or other grain producing vegetation that grows above the snow level. This grain, always planted close to cover, is left standing so that the birds may feed in cover. When the short-growing grain is covered with snow the tall-standing vegetation will furnish food. The price paid for planting the grain patches is about five dollars per acre.

Game birds suffer and die during short periods of severe winter weather, when the ground and natural food is covered with snow. By providing food that may be had from the tall-growing grain during these severe winter periods, the birds are saved.

The plan further contemplates the construction of shelters made from brush. Into these brush heaps the birds can go in severe weather and find protection. Some gravel and sand is placed within the brush heaps for use when the ground is covered with snow.

Suitable signs are put around the reservation warning all persons against trespassing with dog or gun.

PENNSYLVANIA PAYS BOUNTIES ON PREDATORY ANIMALS.

A new bounty law went into effect in Pennsylvania April 15, 1915. Under this new act, which supplants an older one of July 25, 1913, claims are much smaller. The fund from which bounties are paid is created through the operation of the resident hunters' license act. Statistics showing the claims allowed are of interest. Since the law was put into effect a larger and larger number of bounties have been paid. During January bounties were paid on 221 wildcats, 1,030 gray foxes, 1,299 red foxes, 841 minks, 5,586 weasels, representing an outlay of $12,411. We wonder whether the game saved has been proportionate to this expenditure.

THE TURKEY A GAME BIRD IN PENNSYLVANIA.

IN THE OPEN (January, 1916) is authority for the statement that 3,000 wild turkeys were killed in Pennsylvania during the last open season. Up to three years ago turkeys had become so scarce that a close season was declared, and this last year was the first time the season had been opened since 1912. The birds are still very scarce in many of the counties and without doubt turkey shooting will be limited to but a few counties during the coming season, since many of the counties will take advantage of the law which permits the closing of the season by petition.

THE EUROPEAN BISON.

The protected area which shelters it [the European bison] is the Bjelowicz forest, government of Grodno, being thus included in the Russian war zone; the animals have suffered in consequence much deprivation and loss. It contains 150 square miles, with only a few settlements; the animals were fed in winter. Prof. Dr. Conwetz, director of the Prussian State Bureau for conservation of natural monuments, who took a trip to investigate the rumored destruction of forest and endangered condition of the herd, has returned after a stay of several days at Helowicz. He reports that the former number of 600 has been reduced

to about 200, largely through the poaching by Russians. Now a strict interdict against killing of the animals has been issued from headquarters of the German Army, and at the same time a forester of rank has been appointed in charge of forest and herd. The herd had been protected by Russia since 1892, a fine of 500 rubels being provided against killing. Elsewhere in Russia the bison is only found in the Caucasus. In Germany a few exist, a small herd of 30 in the fenced game preserve of 46 square miles belonging to the Prince of Pless.—*Staats-Zeitung*, of N. Y., Feb. 20, 1916 (translated by F. M., March 20, 1916.)

PROTECTION FOR THE BEAR IN PENNSYLVANIA.

The state of Pennsylvania has recently enacted a law giving protection to the bear. The bag limit is one bear per year, and the open season is from October 15th to December 15th, thus being properly set at the time when the fur is prime. The law definitely states that a bear can be killed only by using a gun "held in the hands of a hunter," except when "it is attempting injury on a person or personal property." In the latter case, however, an affidavit telling of the exact injury must be filed.

It is interesting to note that bear are still abundant enough in Pennsylvania so that a party of six in 1914 killed fourteen bear on one hunting trip (*Pennsylvania Sportsman*, Jan., 1916).

NEW YORK PREVENTS KILLING OF DOES.

The state of New York has narrowly escaped the disgrace of a return to the slaughter of female deer through the passage of the Kasson bill by the last legislature. Fortunately, Governor Whitman had the courage to veto the bill. The doe killers of the Adirondacks are consequently denouncing the governor. If the bill had been brought up in a fair way it would probably not have passed either house of the legislature, but by certain tactics the sponsors for the bill succeeded in having it railroaded through the senate when it was least expected.

INTERSTATE COMMERCE IN GAME.

During the year (1915) there were reported to the solicitor's office 27 cases of violations of sections 242, 243, and 244 of the criminal code, known as the "Lacey Act," relating to interstate traffic in game. These involved violations of law in the states of Arkansas, Delaware, Indiana, Iowa, Kentucky, Michigan, Mississippi, Missouri, Tennessee, Virginia, West Virginia and Wisconsin.

The cases now pending in court number 37 and those under investigation, 38. In one case pending in Missouri evidence was obtained disclosing a systematic plan to violate the law in shipping ducks to market in the adjoining state of Illinois. The evidence showed not merely a violation of the Lacey Act, but a conspiracy to accomplish the shipment of ducks out of the state, and the shippers were so charged. This is one of the most important cases which has developed under this act, and the first in which evidence of a conspiracy has been obtained. In the event of a conviction the deterrent effects are likely to be far-reaching.

Recent occurrences in Arkansas, one of the most important centers for the shipment of waterfowl in the Mississippi Valley, are likely to curtail very decidedly future shipments of game from the sunken lands in the northeastern corner of the state. The state supreme court has decided that a local law applicable to Mississippi County, under which shipments of waterfowl have hitherto been made, was unconstitutional, and that the state law prohibiting export of game was applicable to the counties generally. At the recent session of the legislature provision was made for the first time for the appointment of a state game commission to enforce state laws.

The state of Illinois has also amended its game law prohibiting sale of game, whether taken in or out of the state, thus closing the important market of Chicago. These changes will greatly facilitate the work of the department in the Mississippi Valley and make much more difficult the evasion of state and federal laws regulating shipment of waterfowl.—*Report of Chief of Bureau of Biological Survey, 1915, pp. 12–13.*

MASSACHUSETTS WILL ISSUE QUARTERLY.

The Massachusetts Commissioners on Fisheries and Game plan to publish, quarterly at least, a bulletin setting forth the work of the Commission, thus keeping the public more closely informed of its activities. The bulletin will give the violations of the fish and game laws, with the name of the violator and the disposition of the case, and in each issue some live topic will be discussed. Every Fish and Game Commission will find it distinctly to its advantage to follow the lead taken by Oregon, California and Minnesota in this respect. The Commission in each of these states publishes a quarterly bulletin with the object outlined above.

UTAH PLANS GAME SANCTUARIES FOR EACH COUNTY.

The Fish and Game Commission of Utah is planning to have a game sanctuary established in every county in the state. The plan which is being put into effect as rapidly as possible will set aside 250,000 to 350,000 acres as permanent retreats for game and nongame birds and mammals. Present state sanctuaries comprise 22,000 acres for birds and animals near Salina and 15,000 acres at the Strawberry project. Ultimately it is hoped to have also sanctuaries in every county, one for birds exclusively, and one for upland birds, game birds and animals.

GAME CONSERVATION IN NEW MEXICO.

The following clever contrast between the real protectionist and the game hog appeared in a recent number of *The Pine Cone*, the official bulletin of the New Mexico Game Protective Association

"ONCE TO EVERY MAN AND NATION COMES THE MOMENT TO DECIDE."

GAME PROTECTIVE ASSOCIATION OF NEW MEXICO.

1. We stand for vigorous and impartial enforcement of the game and fish laws.
2. We stand for federal control of migratory birds and the prohibition of spring shooting.
3. We stand for a vigorous campaign against predatory animals as a menace to game and livestock.
4. We stand for an adequate system of game refuges.
5. We stand for such an increase in game and fish as will furnish legitimate sport for every citizen.
6. We are opposed in general to the public propagation in New Mexico of foreign species as a substitute for native American game.
7. We are pledged to observe the letter of the law and the spirit of good sportmanship.
8. We are not in politics.
9. We stand behind every warden who does his duty.
10. We offer $50 reward for information leading to the arrest and conviction of any person killing antelope, mountain sheep, or ptarmigan.

APPLICATION FOR MEMBERSHIP.

_____, N. M.
_____, 1916.

President New Mexico Game Protective Association, Silver City, N. M.

DEAR SIR: I subscribe to the above platform and enclose herewith $1.00 dues for 1916. Please forward my application to the proper local association and have me enrolled as a member.

(Signature)
_____

ANCIENT ORDER OF GAME HOGS.

1. We stand for vigorous and impartial enforcement of the game laws—*against the other fellow.*
2. We want the lid off on spring shooting, and *devil take the hindmost.*
3. We stand for a vigorous campaign against Game Protective Associations as a menace to our Ancient Order.
4. We stand for an adequate system of game refuges—*in Indiana.*
5. We wouldn't mind seeing an increase in game and fish. *Take us to it!*
6. We should worry about native American game as long as there is *something to shoot.*
7. To observe the letter of the law when you're liable to get caught is the part of good judgment.
8. We are not in politics—while asleep.
9. We stand behind every warden who *does not bother us.*
10. We offer $50 reward for information as to the whereabouts of any antelope, mountain sheep, or ptarmigan. *We thought we had them all.*

APPLICATION FOR MEMBERSHIP.

_____, N. M.
_____, 1916.

President of the Ancient Order of Game Hogs:

DEAR SIR: The above is my sentiments. I hereby renew my membership for 1916, provided it's free and confidential. These are dangerous times for our Ancient Order!

(Signature)
_____

LIFE HISTORY NOTES.

COYOTE EATS DUCK'S EGGS.

On April 9, 1916, in a pasture one mile from Butte Creek, Sutter County, I was shown a mallard's nest containing ten broken eggs. A herder observed a coyote eating something and on investigating found the ten eggshells. From the photograph (Fig. 57) it can be seen that most of the eggs were broken open longitudinally. Animals nearly always eat eggs in such a way as to break them lengthwise. The herder located the coyote's den in some large holes in the ground in the near vicinity and then destroyed all the coyotes within by blowing it up with dynamite.—George Neale.

Fig. 57. Nest of mallard duck destroyed by coyote. Photograph by George Neale, taken at Butte Creek, Sutter County, April 2, 1916.

THE COLUMBIAN SHARP-TAILED GROUSE IN NORTHEASTERN CALIFORNIA.

The Columbian sharp-tailed grouse (*Pedioecetes phasianellus columbianus*) or "prairie chicken," once extremely common in northeastern California, is now extinct, or practically so. Several letters were recently written by the Fish and Game Commission to residents conversant with game conditions in Modoc County in order to find out where and when prairie chickens were last seen. Among the replies are the following:

Mr. W. S. Crim, of Lookout, Modoc County, states that about fifteen years ago, before there were any game laws in California sharp-tailed grouse were very common in his locality. A short time later but one pair of birds were left on his ranch. This pair raised six young. An attempt was made to protect them but by the following year every one had disappeared. Mr. Claude B. Brown, of the same place, states that, although these birds were once so common that flocks of fifty or more could be seen, they have gradually decreased until they are practically extinct. An unconfirmed rumor is reported by Mr. Brown to the effect that Nora C. Nichols saw two "prairie chickens" on the ranch of William Kramer, about one mile northeast of Lookout, during the fall of 1915. Mr. Charles D. Meissner, Assistant Forest Ranger in the Modoc National Forest, reports that a pair of Columbian sharp-tailed grouse were seen on Timbered Mountain in April or May of last year. Early in April Mr. Meissner saw the cock and hen together and the booming noise made by the cock was heard upon several occasions. Later in the season the hen was seen on two different occasions to tumble off as if wounded and then take flight, which led to the theory that chicks were hidden in the grass. An investigation will be made this spring to determine whether or not sharp-tailed grouse are still present in this section.

Deputy Frank P. Cady, of Susanville, reports that about fifteen years ago there were forty or fifty sharp-tailed grouse at the mouth of Juniper Creek on a ranch owned by Mr. Mackenzie, who allowed no shooting on his property. After Mr. Mackenzie's death the ranch was rented and shooting was allowed with the result that about ten years ago the prairie chickens disappeared entirely. None has been heard of in the northern part of the state during the last ten years, according to Mr. Cady.—H. C. Bryant.

WHITE PELICANS FORMERLY NESTED NEAR SACRAMENTO.

Lone Tree Island, about three miles northwest of the city of Sacramento, was formerly the site of a white pelican rookery. The accompanying photographs showing some of the birds and some of the nests were taken June 28, 1910.—George Neale.

Fig. 58. Nesting colony of white pelicans on Lone Tree Island, three miles northeast of Sacramento. Photograph by George Neale.

ANTELOPE INCREASE IN SISKIYOU COUNTY.

During the winter of 1894 a band of twenty antelope (*Antilocapra americana americana*) were known to exist in eastern Siskiyou County. Since then the herd seems to have increased, due to the protection afforded it. Mr. Davis, former owner of the Mitchell Ranch, near Mount Dome, took great interest in the animals and tried to protect them. He instructed his men to report all violations, and people generally came to regard Mr. Davis as the antelope protector. In spite of this rigid protection there were some who persisted in hunting the animals, for several heads of antelope which had evidently been killed by hunters have been found south of the Davis ranch.

On March 27, 1915, I counted 72 antelope in one band at the south end of Mount Dome. Mr. Edward Daggett, foreman of the Churchill cattle ranch, counted 42 antelope near the Mitchell Ranch on Willow Creek, Siskiyou County, on March 1, 1916. The animals seem to range in small bands of from 8 to 35. It is my belief that these animals now number at least 150 in this vicinity.—G. W. Courtright.

PHEASANTS INCREASE ON YERBA BUENA ISLAND IN SAN FRANCISCO BAY.

The pheasants placed on Yerba Buena Island in San Francisco Bay are apparently increasing rapidly. In addition to the ringnecks placed on the island several years ago, a number of silver pheasants were liberated there last year. Captain Phillip Andrews, Commandant of the United States Naval Training Station situated on the island, reports under date of May 16, 1916, that nine or ten broods of pheasant chicks have been seen within the past few weeks. The broods numbered from ten to sixteen and most of them averaged more than ten. The success being attained here is partly due to the excellent protection and care given the birds.—H. C. Bryant.

MOURNING DOVES BRED IN CAPTIVITY.

A number of years ago while pruning a lemon orchard, I discovered that, in cutting a large limb, I had molested two young well-feathered mourning doves (*Zenaidura macroura marginella*). I brought the birds home and asked Mrs. Hammond to try to raise them. A soft mash of ground seeds (chicken scratch feed), was made, and Mrs. Hammond fed the doves by taking the food between her fingers and placing it in their bills. This feeding operation lasted about 5 or 6 days, after which the birds began to eat alone. In this manner the birds were successfully reared.

The following season the female bird laid twice and hatched four young. I placed the birds in a cage 10 by 10 by 8 feet high. After two years I had about 40 or 50 doves.

On Hallowe'en two years ago some heartless brute managed to put a dog in the cage and it killed all but three birds. These few, however, have been multiplying ever since, and there are now about twenty birds, including two nests each with two young. I placed a dead lemon tree in the cage for the doves to roost upon and have hung cans filled with straw for nest building, from the top of the cage by wires eighteen inches long. The birds rebuild their nests each time they lay. The nesting season begins in March and continues to the latter part of November, and two broods are reared each season.

Doves become very tame and make interesting pets. On several occasions I have liberated some of the birds. Some would stay near by and others would fly away, but none ever failed to return at sundown.—L. W. Hammond.

COURTING OF THE SAGE HEN.

During March, I noted the courting antics of the sage hens (*Centrocercus urophasianus*) in the vicinity of Straw, Modoc County. The male birds gathered on knolls or ridges, and the females kept watch a short distance away. The strutting of the sage hen is much like that of the tame turkey. The tail is spread wide and held vertically, the breast is tilted back and held as high off the ground as possible; the head is held high; then with a bow of the head and an upward motion of the breast the bird makes the "gunpe gunpe" sound.—G. W. Courtwright.

UNITED STATES FOREST SERVICE CO-OPERATION.

SAGE HENS IN THE MONO NATIONAL FOREST.

Sage hens are becoming abundant in many places, especially along the southern end of the Mono National Forest, from Bridgeport south on the open country. In the past their nesting places were badly disturbed by numerous sheep tramping through the country. At present they find quite good protection by restricted grazing and are consequently increasing.—W. M. Manly.

BEAVER ON THE INCREASE IN MODOC COUNTY.

There are several colonies of beaver in the northern part of Modoc County. I am informed by parties well acquainted with that section of the country that this valuable animal is on the increase, undoubtedly due to the protective laws in force. In spite of their highly prized fur, there is no game law more respected than that applying to these interesting animals.—Wm. S. Brown.

ALL VENISON SHOULD BE UTILIZED.

The state of Wyoming has a law prohibiting the leaving in the woods of the meat of elk and deer killed. There should be a similar law in California relating to deer meat. All too often a traveler or camper will kill a buck when he knows he can not use or dispose of the meat, simply for the sake of telling that he got a deer, or perhaps in order to secure the horns as a trophy. In some cases a hind or two may be cut out and the balance of the meat allowed to go to waste. This is a shameful waste and should be prohibited by law. It is one of the reasons why local residents feel antagonistic toward the "city sports," for to the local resident the meat represents a money value in his food supply and he makes full utilization of it.—J. D. COFFMAN.

DEER NEED CLOSED SEASON.

District Ranger E. W. Searcy of the Elsinore District makes the following recommendations concerning deer: "That deer be protected absolutely for 5 years. In case the 5-year close season can not be put into effect I earnestly recommend that the boundaries of the Cleveland Game Refuge, District 24, and the Trabuco division of the Cleveland National Forest be made co-extensive. The Forest boundary markers are well known and it would be an easy matter to post a game refuge marker alongside.—S. W. WYNNE.

DEER AND THE DEER LAW IN TRINITY COUNTY.

District Ranger Chamberlain reports that his observations while on field trips this past season would indicate that deer were scarcer in the Stuarts Fork District than ever before: small deer in particular were very scarce. For the lower Trinity District, on the other hand, District Ranger Graham reports small deer more numerous than usual, and that they destroyed the last crop of alfalfa on most of the ranches in the Lower Trinity and New River sections.

For this region the change in the deer season by cutting out the last half of October, has eliminated the best of the season for local residents. It would have been much more preferable to have had the season shortened by postponing its opening until September 1st, and have allowed it to remain open until October 31st. During August the deer are not in especially good condition, and the meat will not keep well during the hot weather of that month. During October the deer are at their best and the cool weather permits longer use of the meat.—J. D. COFFMAN.

GROUSE IN THE ELDORADO NATIONAL FOREST.

Grouse are disappearing at a rapid rate. Forest officers state the number of grouse seen in the mountains this season is at least 10 per cent lower than the preceding year.

Grouse should be protected by a closed season of not less than five years. And closer supervision by game wardens.—E. L. SCOTT.

THE ANGELES FOREST GAME REFUGE.

The Angeles Forest Game Refuge has worked out admirably, and we have had but one violation where a man living just inside the Refuge shot some quail on his own land; this case is now pending a decision. I find that the Game Refuge is very popular in this section, even among the resort owners, who are the only ones financially affected. I have interviewed practically every resort owner—and there are some 25 within the Refuge—and not one of them has objected to it. The only objection I hear is in not being permitted to bring into the Refuge game shot on the outside. I hope another year the Commission can see its way clear to employ the two men suggested by Mr. DuBois whose duty it will be to check any deer killed on the outside, but which it is necessary to bring through the Refuge in order to get them out.—R. H. CHARLTON.

PECULIAR DEER KILLED IN SANTA BARBARA NATIONAL FOREST.

Antlers of a deer killed several years ago near Cuyama Valley, Santa Barbara County, by Forest Guard Eugene Johnston, of the Santa Barbara National Forest, have been identified as belonging to a species of deer found in the eastern states, by a member of the California Academy of Science, San Francisco. No explanation is vouchsafed as to how the deer travelled so far west

FISHING IN THE ELDORADO NATIONAL FOREST.

Exceptionally fine weather, good roads, and the opening of the fishing season on May 1st lured local and Sacramento anglers to the streams in and adjacent to the Eldorado National Forest, particularly the south fork of the American River and smaller tributary streams. But because of high water, due to melting of the unusually heavy snowfall of last winter, the trout could not be induced to take the fly. By the use of angleworms, however, a few fair catches were made during the first half of the month. Cooler weather, accompanied by light rain, and on May 24th a light fall of snow over the Forest, has precluded activity by anglers.

Many anglers have voiced the sentiment that May 1st is too early to open the trout fishing season in this locality, since spawning is not completed at this date. They suggest May 15th, or even June 1st.

Residents of the Lake Tahoe basin and visiting anglers have expressed the opinion that the high rate of mortality of fish that spawn in the streams tributary to Lake Tahoe is due to the debris—dumped timber and vegetation—found in these streams. This debris is said to harbor the leech, a parasite which attacks the gills of fish. The removal of the debris is suggested as an aid to trout propagation, rather than the present method of frequent restocking with fish fry.

During the winter months, sportsmen professed an extreme mortality among wild animals because of the unusually heavy snowfall, but reports to date from areas frequented by deer indicate that unusual mortality did not occur among these animals.

LARGE TROUT TAKEN AT STONY CREEK DAM.

Large catches of trout have been made recently above the Stony Creek diversion dam in the California National Forest. The average size of the fish caught above the dam is very much larger than those taken in other parts of the stream, due probably to the greater protection from natural enemies afforded by the deep water above the dam.

This dam was constructed in 1914 by the United States Reclamation Service for the purpose of diverting the flood waters of Stony Creek to the East Park Reservoir and it makes in itself a reservoir half a mile long by thirty feet deep at the dam.

TRINITY DEER REFUGE.

The establishment of Game District No. 2 was a very desirable step in the conservation of the deer in this region. The forest officers of the Trinity are assisting Deputy Laws as much as possible in the administration of this refuge. It is quite important, however, that the boundaries of this refuge should be completed before the opening of the next hunting season, and for this work Mr. Laws will need money for the employment of temporary labor. The Commission should provide Mr. Laws with funds for this purpose.—J. D. Coffman.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING MARCH 31, 1916.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Contra Costa, Alameda	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Albacore											55					55
Anchovy									150		4,270					4,420
Barracuda										3,100	506,467	43	48,190			[illegible]
Bonito										1,800	2,842		1,675			5,817
Bocaccio							6,591	1,457	22,950							31,000
Bluefish																
Chilipepper								4,805	65,350							[illegible]
Carp				14,788	22,700	37,656	702									[illegible]
Catfish		17,982		13,116	3,641	7,616										42,355
Coalfish								250								250
Cultus cod	512						178,270	28,445	78,241							[illegible]
Dogfish							3,100				3,119					6,219
Flounder	10,111		2,699			279	[illegible]	3,935			2,397					[illegible]
Halibut (California)	341						5,273	4,090	954	5,400	521,904	5,856	955		149,214	[illegible]
Hake							1,175				825					2,000
Herring	3,750		25,250			61,318	1,199,310	20								[illegible]
Klugfish							455	27,395	17,546		236,840					[illegible]
Mackerel									3,977	3,300	129,146	100	11,917			148,440
Mullet														250		250
Pike (California)				698	2,280	2,270										5,248
Pompano							1,057	117			11,650					12,824
Perch	5,750	45	31,440			100	4,824		1,000		[illegible]	5				[illegible]
Rock bass											141,694	2,877	[illegible]			[illegible]
Rockfish (miscellaneous)	3,447	6,704					67,398	[illegible]	217,250	4,500	[illegible]	[illegible]	[illegible]			1,197,387
Sole		43					[illegible]	[illegible]	1,651		1,220		211			1,130,031
Salmon		70		[illegible]	3,871	[illegible]	[illegible]	1,195	[illegible]					5,891		[illegible]
Smelt	13,174		14,023			1,500	13,463	43	5,625	7,475	[illegible]	4,360	[illegible]			[illegible]
Sea bass (white)							42	591	491	1,400	74,347		1,443			77,340
Sea bass (black)											4,000		14,191			18,251
Sandab							[illegible]	[illegible]	75		3,207	50				[illegible]
Striped bass		26	4,202	[illegible]	1,405	[illegible]	[illegible]		150							[illegible]
Shad				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								[illegible]
Sturgeon				[illegible]	180	[illegible]								150		[illegible]
Sardine			5,675						[illegible]		[illegible]					[illegible]
Skate							[illegible]	[illegible]			1,187					[illegible]

Sculpin												1,691				1,691
Sea trout																
Trout and						100	33,114					64				33,178
Trout (lake)																
Trout (steelhead)																
Turbot			1,420					120								1,540
Whitefish			6,444			50	340									6,834
Yellowtail												293,140	50	4,200		297,390
Miscellaneous	2,197			6,000	17,270	1,100	18,000	48,450	610			12,002				105,629
Total fish	89,251	24,092	89,717	179,004	56,146	349,760	2,879,143	298,508	1,004,004	25,575	2,376,303	13,583	492,242	6,226	000,000	8,537,304
Crustaceans—																
Crab (fresh)	1,300	64	654				9,100	2,600	3,148							17,000
Spiny lobster										8,362	35,752	1,735	44,864		23,000	113,853
Shrimp							71,736									71,736
Peruvian																
Mollusks—																
Squid									24,021		25,607					49,628
Cuttlefish							41,308	4,209	1,094							47,301
Clams (Pismo)								2,605		43,909				344		46,858
Clams (cockle)			25,000				46				1,200	164				27,000
Clams (softshell)		8,485	43,040			36,859	9,926									98,910
Clams (mixed)	70,310		1,015				400		810		2,522			50		25,107
Oysters (shell), number		240	2,400				3,602,840									3,606,045
Abalones		972						2,240	15,654	1,404		36		100	76,558	96,984
Mussels	640		345					1,170			16,675					18,830

N.B.—The figures denote pounds, except where otherwise stated. Salmon, codfish, and whale products from distant waters, brought in by boats operating out of California ports, while rightly belonging to California fishing products, are not included in the table.

NUMBER OF DEER KILLED IN VARIOUS COUNTIES DURING THE OPEN SEASONS 1914-15.

District No. 1.

County	1914	1915
Alpine	39	66
Amador	36	43
Butte	29	26
Calaveras	202	111
Del Norte	*	[illegible]
El Dorado	360	[illegible]
Fresno	151	156
Humboldt	200	167
Inyo	40	[illegible]
Kern	235	121
Kings	14	1
Lassen	[illegible]	126
Madera	57	34
Mariposa	53	10
Merced	†	*
Modoc	160	[illegible]
Mono	102	4
Nevada	143	[illegible]
Placer	77	87
Plumas	200	93
Sacramento	30	*
San Joaquin	8	*
Shasta	357	[illegible]
Sierra	37	11
Siskiyou	575	[illegible]
Stanislaus	†	51
Sutter	*	*
Tehama	198	164
Trinity	735	543
Tulare	128	223
Tuolumne	203	174
Yuba	6	14
Totals	4,464	4,028

District No. 2.

Colusa	250	[illegible]
Glenn	90	[illegible]
Lake	161	84
Marin	320	[illegible]
Mendocino	268	[illegible]
Solano	14	5
Sonoma	[illegible]	200
Yolo	[illegible]	127
Napa	373	119
Totals	1,950	1,997

District No. 3.

County	1914	1915
Alameda	8	$125
Contra Costa	*	†
Monterey	632	595
San Benito	11	55
San Francisco	No hunting	
San Luis Obispo	60	155
San Mateo	5	35
Santa Clara	5	362
Santa Cruz	155	$132
Totals	876	1,479

District No. 4.

Imperial	*	*
Los Angeles	143	95
Orange	24	*
Riverside	102	55
San Diego	45	44
San Bernardino	97	29
Santa Barbara	475	338
Ventura	*	172
Totals	886	733

Reports Unspecified as to Counties.

Shasta National Forest	87	
Lassen National Forest	13	
California National Forest	238	
Stanislaus National Forest	96	
Santa Barbara National Forest	89	
Sierra National Forest		105
Totals	523	105
Total for year 1914	8,699	
Total for year 1915		8,343

*No record. †Close season. ‡Estimated.

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

March 1, 1916, to May 31, 1916.

Game.

Deer meat	184 pounds
Deer hides	27
Quail	1
Non-game birds	12
Rabbits	2

Fish.

Striped bass	463 pounds
Trout	139 pounds
Salmon	140 pounds
Miscellaneous fish	342 pounds
Crabs	11
Abalones	973
Pismo clams	200
Nets and lines	61

Searches.

Illegal fish and game	28

VIOLATIONS OF THE FISH AND GAME LAWS.

March 1, 1916, to May 31, 1916.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without license	23	$115 00
Deer, close season, killing or possession	18	225 00
Female deer, spike bucks, killing or possession	6	200 00
Illegal deer hides	5	250 00
Nongame birds, killing or possession	4	25 00
Cottontail rabbits, close season, killing or possession	2	20 00
Ducks, close season, killing or possession	3	75 00
Quail, close season, killing or possession	8	200 00
Shore birds, close season, killing or possession	1	25 00
Total game violations	70	$1,735 00
Fish.		
Angling without license	23	$[illegible]20 00
Fishing for profit without license	11	210 00
Dealing in fish wholesale without license	1	20 00
Trout, close season, taking or possession	25	[illegible]5 00
Trout, excess bag limit, taking or possession	10	161 00
Failure to maintain screen in irrigating ditches	1	35 00
Pismo clams, underweight, excess bag limit	15	180 00
Abalones, undersized, taking or possession	6	140 00
Crabs, undersized, taking or possession	4	30 00
Black bass, close season, taking or possession	1	20 00
Striped bass, underweight, taking or possession	2	20 00
Striped bass, shipping from state	5	[illegible]
Salmon, underweight, sale	2	300 00
Young of fish, taking or possession	2	50 00
Chicken halibut, underweight, sale	1	25 00
Illegal nets	15	400 00
Total fish violations	124	$2,656 00
Grand total fish and game violations	194	$4,091 00

FINANCIAL REPORT.

Statement of Expenditures for the Months of February, March, and April, 1916.

	February	March	April
General administration, salaries, traveling expenses, rentals, supplies, etc.	$1,925 07	$2,184 18	$2,249 87
San Francisco district, salaries, traveling expenses, rentals, supplies, etc.	4,519 04	5,469 58	5,674 04
Sacramento district, salaries, traveling expenses, rentals, supplies, etc.	3,531 72	3,386 42	3,667 78
Los Angeles district, salaries, traveling expenses, rentals, supplies, etc.	1,705 50	1,900 03	1,694 71
Fresno district, salaries, traveling expenses, rentals, supplies, etc.	1,474 19	*	*
Hatchery administration, salaries, traveling expenses, supplies, etc.	817 21	766 09	762 19
Fishery research and publicity, salaries, traveling expenses, supplies, etc.	308 98	542 57	444 91
Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc.	349 41	382 25	316 16
Fish transplanting, salaries, traveling expenses, supplies, etc.			
Fish distribution cars (1 and 2) salaries, traveling expenses, rentals, supplies, etc.			88 52
Fish patrol launches, salaries, traveling expenses, rentals, supplies, etc.	749 76	1,034 02	1,021 92
Sisson Hatchery, salaries, traveling expenses, supplies, etc.	1,656 67	1,536 71	1,577 91
Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc.	361 71	323 98	377 00
Tahoe Hatcheries, salaries, traveling expenses, supplies, etc.	10 00	406 44	440 91
Price Creek Hatchery, salaries, traveling expenses, supplies, etc.	43 10		
Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc.	299 80	660 69	581 59
Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc.	249 47	322 86	326 69
Bear Valley Hatchery, salaries, traveling expenses, supplies, etc.		332 69	383 33
Marlett Lake and Carson hatcheries, salaries, traveling expenses, supplies, etc.	17 40	15 00	15 00
Fort Seward Hatchery, salaries, traveling expenses, supplies, etc.	82 00	1,073 74	1,033 68
Inyo County Hatchery, salaries, traveling expenses, supplies, etc.	99	540 93	6,631 00
Almanor Station, salaries, traveling expenses, rentals, supplies, etc.		59 52	264 15
Game farm, salaries, traveling expenses, supplies, etc.	395 31	222 43	226 95
Game research and publicity, salaries, traveling expenses, supplies, etc.	237 52	298 01	315 57
Prosecutions and allowances	220 42	274 60	263 96
Hunting license commissions and refunds	379 60	591 20	1,025 90
Anglers' license commissions and refunds	569 30	88 70	180 60
Market fishing license commissions and refunds	2 50	17 00	140 00
Crawfish and abalone inspection	200 00	200 00	100 00
Winter game feeding	229 63		36 76
Mountain lion bounties	580 00	500 00	340 00
Printing and lithographing	69 37	203 97	426 28
Claims paid account accidents			
Totals	$20,985 67	$23,233 61	$30,592 38

Balances: March 1, 1916, $109,121.65; April 1, 1916, $86,029.53; May 1, 1916, $70,877.80.

*Included in San Francisco and Los Angeles districts.

CONTENTS.

		Page
CALIFORNIA CLAMS	*Harold Heath*	175
A POSSIBLE ENEMY OF THE MOSQUITO	*Clarence H. Kennedy*	179
ABALONE PEARL FORMATION	*John H. Oliver*	182
FISH AND GAME IN SAN MATEO COUNTY	*J. S. Hunter*	185
SHOOTING QUAIL FOR MARKET IN SAN MATEO COUNTY	*B. B. Ralston*	188
EDITORIALS		189
HATCHERY NOTES		199
COMMERCIAL FISHERY NOTES		203
CONSERVATION IN OTHER STATES		211
LIFE HISTORY NOTES		212
UNITED STATES FOREST SERVICE CO-OPERATION		213
WILD LIFE IN RELATION TO AGRICULTURE		215
REPORTS—		
Violations of Fish and Game Laws		219
Seizures		219
Financial report		220

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 2 SAN FRANCISCO, OCTOBER 18, 1916 Number 4

CALIFORNIA CLAMS.

By HAROLD HEATH, Department of Zoology, Stanford University.

Of the various species of clams, mussels and snails inhabiting the rocky headlands, muddy inlets, and sandy beaches of the California coast, no less than fifteen are of prime economic importance and are steadily growing in favor among the people of the state. Unfortunately the demand for such articles of food has outstripped the supply, and several localities once thickly populated with these animals have passed the limit of profitable digging. Even in the most favorable districts the catch is steadily diminishing or is harvested with increasing difficulty.

This condition of affairs has been brought about by several agencies. Intensive digging, occasionally with the aid of plows and harrows, wrought havoc in the past; the indiscriminate taking of clams of any and every size was likewise an important factor; and tremendous storms, such as the one which swept the coasts of the southern third of the state two years ago, were equally destructive. However, those who foresee the total extermination of this class of animals probably claim too much. A scanty population still exists on the abandoned beds, small, scattered groups inhabit isolated beaches, and the shore immediately beyond the low tide mark doubtless supports a goodly number. It is reasonable to believe that, when undisturbed, the young from such sources will gradually migrate and restock the now unproductive districts. Following the custom of the past these replenished areas will then be dug intensively with a resulting period of lean years. Needless to say such a method of procedure does not constitute conservation of a high grade.

Clam protection looking toward a uniform annual crop is confessedly in the experimental stage on the west coast of the United States. Theoretically a limit placed on the daily catch should bring about the desired result. In practice it may be necessary to close entirely certain districts for a period of years until a point is reached where the daily limit will not reduce the beds to the level of relatively unprofitable digging. It is frequently claimed that the species of clams living along shore extend beyond the low tide limit for long distances out to sea; but as a matter of fact conclusive evidence is largely lacking on this point. Japanese abalone divers have seen the so-called Pismo clam (*Tivela stultorum*) in fairly deep water about Morro in San Luis Obispo County, and dead shells of other species have been brought up on sounding leads at several points along the coast. The red abalone extends to a depth of at least two hundred and fifty feet but proof that

it extends beyond this point is lacking. Certain it is that after a bed has been cleaned up there is little to indicate that these deeper situated individuals migrate beachward. On the other hand, restocking appears to be largely due to young individuals.

Clams annually produce astonishingly large numbers of eggs. For example, a Pismo clam (See figure 59), somewhat over five inches in length, lays not less than 300,000; the ordinary black mussel (*Mytilus californica*) deposits fully 100,000; the red abalone (*Haliotis rufescens*), with a circumference of from eighteen to twenty inches, annually pro-

Fig. 59. Pismo clams in San Luis Obispo County. Photograph by C. S. Bauder.

duces between 1,000,000 and 2,000,000; and other species lay proportionately great quantities. On the basis of these facts, extravagant claims are made, one pair of clams being deemed sufficient to stock a beach fully a mile in length. It is stated on good authority that, were the offspring of all of the codfish to come to maturity, we could travel across the Atlantic and Pacific oceans, in a very few years, on the backs of codfish. Needless to say such a trip will never be made. Just as in the case of the codfish, the young clams from the beginning of their development are subject to the attacks of enemies, oceanic currents drive them into unfavorable situations, and a shortage of the food supply destroys myriads. This last named factor is perhaps the most important. The food of all clams and mussels consists *entirely* of minute animals and plants or fragments of larger organisms floating within reach of multitudes of tiny, vibrating, hairlike processes covering the body, which sweep these nutritive substances into the mouth. In the presence of an abundant food supply, it appears that beds abandoned by the clam digger have become restocked after a period of from seven to ten years. Other beds seemingly as well situated have remained untenanted after an interval of at least fifteen years.

This brings up the matter of artificial transplanting of clams. Generally speaking, the eggs of these animals are poured from openings of the body into the sea where they are fertilized by the male element. After a few days the resulting young become free-swimming, and by their own efforts and the agency of tidal currents, become widely scattered. Where a bed lies in the direct path of such currents it bids fair to become planted with young individuals; otherwise, equally favorable situations may remain unstocked. In several instances beds belonging to this last named class have been planted by hand and today are flourishing. In San Francisco Bay, for example, the soft shell, or mud, clam (*Mya arenaria*) was planted upwards of fifty years ago from stock taken along the Atlantic Coast. At the present time it is widely distributed and forms a valuable food product in

Fig. 60. Digging Pismo clams at Watsonville Beach, Santa Cruz County.

several of the western markets. Morro Bay, the Goleta estuary north of Santa Barbara, the estuary of Playa del Rey at Los Angeles, False Bay at San Diego, and the upper end of San Diego Bay appear to be good grounds for this species. The experiment could be made with comparatively little expense, and with an already established market, it is certainly worth the effort.

The Pizmo clam, or quahog, has likewise been transplanted in several localities with gratifying results. In this connection it is important to note that large individuals of practically every species of clam are relatively helpless when removed from their burrows. Those species, like the mud clam with a "neck," which remain throughout life in a fixed situation, should be planted neck upward in holes (about three times the length of the shell) made by pushing a stake into the mud or sand. Roving types like the rock or sand clam, cockles, and Pizmo clam, merely require to be buried a few inches.

The claim is often made that young clams are more tender and of better flavor than the mature animals; that protection therefore should be given the breeders; and the immature individuals only should be gathered. The first contention is undeniably correct, but were we to collect the young, it is to be doubted whether there would be any breeders to protect. It is safe to say the average clam digger, professional or otherwise, would rarely take the time to carefully bury the

larger individuals turned out in the course of a day's work; and, as indicated in the foregoing paragraph, unless these breeders are buried there is a small chance indeed that they will re-enter the sand or mud.

Furthermore, it is entirely possible to make commercial use of clams seldom, if ever, found in the markets at present. The ordinary black mussel (*Mytilus californica*), adhering by thousands to the rocks along several sections of our coast, is delicately flavored, grows rapidly, and deserve a wider market than it now has. A closely related species in France is nearly as highly esteemed as the oyster. On the west coast of North America there is a tradition that these animals are poisonous during certain months of the year. As a matter of fact they are no more harmful than other clams or oysters. When shellfish of any species are exposed for comparatively long periods of time on the rocks or in restaurant windows, where ice or cold water are lacking, the mucous coating of the body may become infected with bacteria and develop poisonous products in consequence. Obviously such a state of affairs is more readily brought about in the summer, and the old saying that oysters should be eaten only in months containing the letter "r" probably rests upon this fact. The breeding season of most of our edible mollusks also occurs in the summer, and after the sex products are shed the flesh is often rather watery and insipid. Nevertheless, if one is so inclined, there is no reason why he should not indulge his taste for this class of food during every month of the year.

The macomas, or white (*Macoma secta*), and bent-nosed (*M. nasuta*) sand clams are likewise highly palatable. Unfortunately, the digestive tract usually contains varying quantities of sand, though it is possible that this would pass from the body if the individuals were placed in submerged, anchored boxes. The experiment is well worth trying. The saxidome, big clam or butter clam (*Saxidomus giganteus*) is also abundant on various beaches throughout the state but is only sparingly dug. In adult individuals the shell, white or gray in color, measures from two to three inches in length and is marked by distinct concentric ridges parallel to the edge of the shell. Along the coast of British Columbia this species is extensively used and in California deserves to be marketed in greater quantities than at present.

In conclusion it may be said that the growth of a clam, mussel, oyster, abalone, etc., depends in large measure upon the amount of food available. One individual may reach the market size in two or three years or even less, while another from the same parent may remain of small size. Just now we are greatly in need of data relating to the rate of growth, to the breeding season, to the size when the various species commence to spawn, to the time of spawning and to the various species inhabiting beds of a given district. Conditions differ along the hundreds of miles of California coast, and in order to gain an adequate notion of the subject as a whole, it is highly desirable that careful observations be made in several distinct localities. Evidence of this character, accompanied by specimens when practicable, if sent to the State Fish and Game Commission, will go far toward clearing up many obscure features relating to shellfish and their culture.

A POSSIBLE ENEMY OF THE MOSQUITO.

By Clarence Hamilton Kennedy, Cornell University.

During July and August, 1915, the writer, through the assistance of the California Fish and Game Commission, had the opportunity of studying the aquatic insects in the streams of southern and eastern California, and of collecting the native fishes in the Mojave and Owens River watersheds. The work concerned itself principally with the problem of fish foods.

Among the things of interest discovered was a top-minnow in the Owens River, which can probably be used to advantage in combating the mosquito in those parts of the state where these insects are a pest about permanent fresh-water marshes. The only name that this interesting little fish bears besides the name "top-minnow," which the other members of this insectivorous family also carry, is its rather formidable

Fig. 61. The western top-minnow, *Cyprinodon macularius*. X3.

scientific name, *Cyprinodon macularius*. This name is unfortunately almost twice as long as its owner, as this fish is usually less than one and a half inches in length.

The top-minnows are a family of small fishes, the greater number of which feed on the various minute insects that breed in shallow water. It is in such a family of small insectivorous fishes that one would naturally look for an enemy of the mosquito. *Cyprinodon macularius* is the second top-minnow so far discovered in the fresh waters of California. Probably it has entered from the Colorado River drainage, where it is widely scattered. It is fortunate that a member of this useful family of fishes occurs as a native of the state, for such can be more readily utilized for mosquito control than any of those top-minnows native to the Central States.

A lengthy description of *Cyprinodon macularius* is superfluous as the drawing (fig. 61) shows the peculiar, barred pattern in shades of gray and white, which characterizes Cyprinodon. It seldom reaches over an inch and three-quarters in length and has a deep, bass-like shape. In the Owens Valley it is thought by many local people to be

the young of the large-mouth black bass, which was introduced into the valley by the State Fish and Game Commission a few years ago.

This fish was found in abundance in all the shallower parts of the sloughs and tule swamps at both Lone Pine and Laws. It was most abundant in the edges of the large tule swamp that lies in the big bend of Owens River between Laws and Bishop. At Laws the writer observed schools of these top-minnows nipping at specks floating in the little ditch that irrigated the hotel yard. This ditch was not over eighteen inches wide and six inches deep, and was over half a mile from the river. Every pool cut off by a gravel bar along the river contained a few of these little fish. They were apparently entirely comfortable in water not over four inches deep. The writer collected quantities of these fish by placing a butterfly net in the water and frightening the little fellows into it. By careful maneuvering sometimes a half a pint could be caught in one "haul of the net." A half

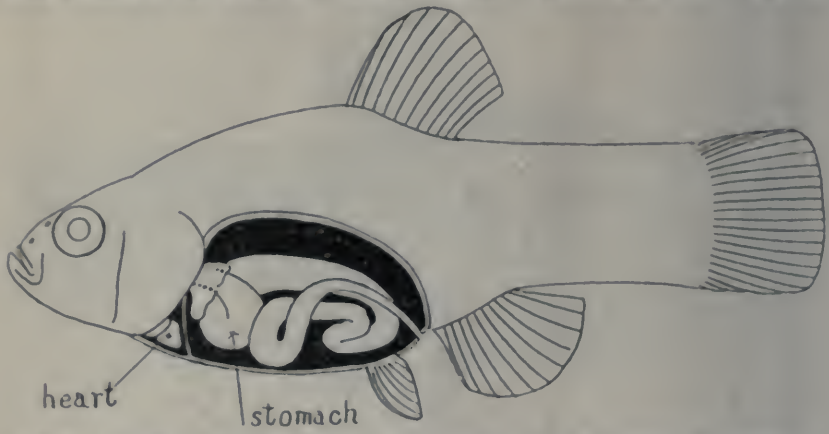

Fig. 62. Outline drawing showing the alimentary canal of the western top-minnow.

pint is a large number of these fish midgets, as they will average over two hundred and fifty individuals to a full pint. This small size is this fish's advantage, for as a consequence there is available to it as food the quantities of minute aquatic insects too small for the food of larger fish. Its small size also permits it to explore with ease and safety the shallow side pools swarming with insect life, that are too shallow for larger kinds of fish. In the fish "navy" these small fellows can be considered from two points of view as the "mosquito fleet."

The most interesting, though perhaps the most tedious part of this study, was the dissection of the fish and study of the stomach contents of these top-minnows. The illustration shows the arrangement of the alimentary canal (fig. 62). The stomach is quite long, contains a loop and shades insensibly into the intestine. The stomach had to be dissected out, opened, and its contents placed in a watch glass for a bowl, where the partially digested food could be examined under a microscope. The stomachs of all the fish examined were crammed with insect remains. Apparently Cyprinodon's appetite was larger than his stomach. In nearly all cases nine-tenths of the contents were Chironomid fly larvæ (fig. 63). The Chironomid flies are a family of insects

so closely related to mosquitoes that only a trained entomologist can tell the insects of these families apart. Figure 64 shows the mosquito-like form of a Chironomid. The larvæ, usually bright red in color and

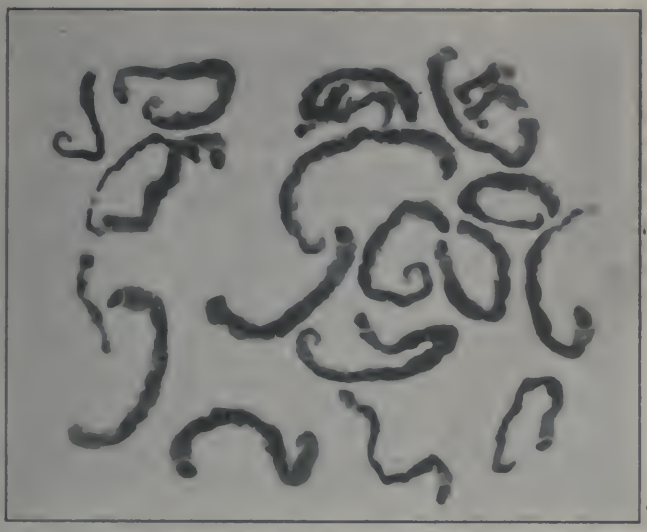

Fig 63. Chironomid larvae, the entire contents of the stomach of fish no. 14.

spoken of as blood worms, live in water much as do mosquito larvæ, while the adults are harmless, except a few species that suck blood, as do mosquitoes.

The following table shows the stomach contents of fourteen fish.

No.	Length of fish in inches	Chironomidæ (midge)	Other food
1	1½	6 larvæ	
2	1½	18 larvæ	1 Estheria (crustacean).
3	1½	24 larvæ	
		6 pupæ	1 beetle.
4	1½	4 larvæ	
5	1½	20 larvæ	
6	1½	2 larvæ	
		1 pupa	1 beetle, 1 mayfly larva, 1 adult mayfly.
7	1½	32 larvæ	
		3 pupæ	1 beetle larva.
8	1½	28 larvæ	
9	1½	12 larvæ	
		9 pupæ	1 mayfly, 2 mayfly nymphs.
10	1½	28 larvæ	
		2 pupæ	1 mayfly larva.
11	1½	4 larvæ	
		2 pupæ	1 mayfly nymph.
12	1½	14 larvæ	(This was a female with 50 mature eggs.)
13	1½	16 larvæ	(This was a female with 45 mature eggs.)
14	1½	17 larvæ	

The great predominence of Chironomid larvæ and the large number in each stomach show at once what efficient destroyers of water insects these little fellows are. The absence of mosquito larvæ can be readily

accounted for by the lateness of the study, as mosquitoes have largely disappeared by August, through other causes. Chironomid larvæ are always abundant, for they have gills and not being compelled to come to the surface to breathe, as are mosquitoes, they live on the bottom and in trash where they have more protection from their enemies. The mosquito larvæ being compelled to live at the surface, where they are easily seen, are probably cleaned up by the fish early in the season.

Fig. 64. A chironomid fly. These flies are close relatives of the mosquitoes and breed in all running and stagnant water.

At the time (August) of the writer's visit, mosquitoes were not troublesome at Laws, for the evenings were usually spent under the trees in the hotel yard, where entertainment was furnished by the hotel phonograph. Furthermore, the various individuals interviewed were positive that mosquitoes were never bad in the Owens Valley. If so, the condition is very different from that which exists in other irrigated sections of the West, for mosquitoes are usually one of the unpleasant features of irrigated pasture land.

The stickle-back, another small fish, has been tried as a mosquito exterminator, in parts of the state, with some success, but only a thorough trial can show whether this top-minnow can be used in territory outside of Owens Valley. Probably it can be of use in any permanent fresh-water marshland in the state, up to 3,000 or 4,000 feet elevation. Top-minnows of other species have been introduced with considerable success into Hawaii to combat mosquitoes.

ABALONE PEARL FORMATION.

By J. H. Oliver.

Every one along the Pacific Coast is familiar with the abalone blister pearl (pholas caused) commonly seen in jewelry store windows. These are natural pearls taken from abalones (*Haliotis* sp.). The supply of these pearls, as well as the beautiful shells of the abalone, so widely used commercially, is fast becoming exhausted, due to the disappearance of this shellfish. Following along the rocky shore one observes this sign: "Abalone Trail," but as a rule, look as you will, you will find no abalones, so complete has been the destruction.

By the united effort of a number interested in the preservation of this beautiful species of the sea snail, laws were passed to check its obliteration, and a series of investigations were instituted. In each succeeding year gradual obliteration has been noted. Places where experimental work was carried on four years ago, and where abalones were then very plentiful, showed in March, 1916, an almost entire extirpation of the species. Better laws are now in force, but they need to be more widely observed.

In order to make a strong plea for the preservation of the abalone, a series of experiments to discover whether pearl nacre deposits could be induced within the abalone, have been carried on under a permit from the California Fish and Game Commission. Figure 65 shows the result of five months' deposit of nacre, after inserting a form against the mantle. This period of time appears to be too long for best results. Specimens of less nacre deposition have been secured in 57 days. These have been sent for record, observation, and study, to the zoology department of the University of California. Experiment has shown

Fig. 65 An artificial pearl produced by an abalone. This pearl is the result of five months' deposit of nacre.

the time for best results to be between 75 and 100 days. It requires from 1,400 to 1,500 days to secure similar results with Japanese culture pearls. Thus, our abalone deposits the desired nacre in one-fifteenth or one-twentieth of the time required for the formation of Japanese pearls, and it is evident that 15 or 20 pearls will be formed in the abalone while one is being deposited in the Japanese shells.

Variously colored pearls may be produced. In one instance a white pearly shell produced a most beautiful blue pearl. By noting the change of colors in the same pearl in different stages of formation, much is being learned of the causes underlying the production of color. After dissecting some of these pearls I am convinced that the various colors are produced by a dark skin, deposited between the layers of nacre, which acts as a reflecting surface. If this dark skin is removed from a thin pearl and replaced by a new color, such as magenta or blue, the color of the pearl is immediately affected by the new colors. When a sufficient amount of the dark skin is deposited with the nacre the valuable black pearl such as is found at Magdalena Bay, Mexico, is produced.

Figure 66 shows how numerous pearl deposits may be within the abalone and the abalone be unharmed. The specimen shown came from the vicinity of Morro Bay and displays nine perfect pearl forms and nine imperfect ones. The Point Lobos section produces larger, but less pearly colored forms; the Fort Bragg section numerous very large, irregular, and often seriously diseased forms, whereas the coasts of Mexico and southern California produce jet-black pearls in small quantity. The most favorable section for pearls of quality is Morro Bay (Cayucos, San Simeon, Port Hartford), while for those of size is Monterey (Point Lobos).

The results obtained in these experiments are not exceptional nor local, for similar and equally valuable results were secured along the

Fig. 66. Pearls artificially produced in an abalone by inserting forms against the mantle. Many pearls may be produced without injury to the shellfish. It took five months to produce these pearls.

English Channel at the Roscoff Laboratory by the late Dr. Boutan of Paris. Dr. Boutan's results as summarized in *La Nature* were published in the *Scientific American Supplement*, No. 1214, April 8, 1899. The report says: "All the abalones have secreted nacre on a level with foreign bodies introduced, and, in many shells, have formed, at the surface of the nacre, pearls, genuine, fine pearls, of which I submitted some samples at the Academy." (See fig. 67.)

"The first pearls obtained were not sufficiently detached from the shell and exhibited too wide a base of junction with the latter. In the subsequent experiments this defect was partially corrected; and, in recent specimens, it may be seen that the part of the pearl nearest the shell is covered with a layer of nacre.

"It must be remarked, however, that although the pearls thus obtained artificially have the same chemical composition as natural ones, and have circular layers only at the periphery, which gives them the aspect sought, they contain in the interior a large nucleus of nacre, of which the placing of the layers is necessarily different from that of the periphery."

Not only is the life of the shellfish conserved when pearls are produced artificially, but the animal can be forced to produce better pearls just as a cow can be forced to produce better milk and a chicken better eggs. In each instance the pearl is quietly removed and another form inserted in exactly the same place, and the abalone under more normal conditions produces pearl after pearl, as long as that portion of the mantle produces pure nacre. One mantle location produces

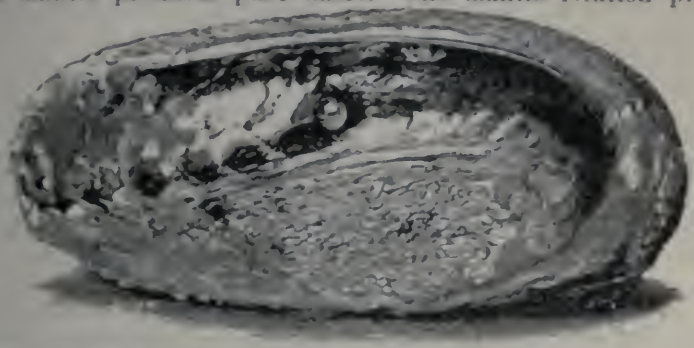

Fig. 67. Shell containing a pearl (From M. Boutan in Scientific American Supplement, April 8, 1899).

pearls in one shape and color, while another part produces an entirely different shape and color. How long an abalone will continue to produce pearls has not been determined.

It has been demonstrated that pearls of exquisite color and of great variation can be obtained by artificial means in the abalone. Pearl culture in California is therefore more than a possibility. All that is needed in order to develop a new and profitable industry is the conservation of the shellfish concerned, and the working out of the details of artificial pearl culture in some scientific laboratory.

FISH AND GAME IN SAN MATEO COUNTY.

By J. S. Holmes, Assistant Executive Officer, California Fish and Game Commission.

Although all parts of San Mateo County are within thirty-five miles of San Francisco and but a few hours' ride by auto, there are few sections of the state better supplied with game and fish. A few years ago much better hunting was here available, but the coast region of San Mateo County still has much to offer.

Deer are plentiful in San Mateo County, owing largely to the great tracts of land upon which hunting is limited or entirely prohibited. On the Spring Valley land, comprising 30,000 acres, upon which hunting is exceedingly limited, and in the California Redwood Park, just across the south line of the county, where no hunting is allowed, deer breed undisturbed and increase rapidly. It is not unusual to see as many as a dozen deer in driving through the Spring Valley lands. When this protected area becomes crowded with deer, the overflow spreads into the adjoining parts of the county where hunting is allowed.

The protection thus afforded has made it possible to kill an average of 150 deer each year during several seasons past. Deer find the San Mateo hills particularly attractive and the cover is so thick that hunters are at considerable odds unless assisted by packs of well trained dogs.

The grizzly bear was once a common resident of the San Mateo peninsula. It is said that these bears were larger than the famous Kadiak Island grizzlies, supposedly the largest in the world. Many interesting tales are told of the raids of the grizzly on the San Mateo ranches in the early days. It is probable that the last grizzly was killed in the early seventies. Black bears were also resident, and the last one is reported to have been killed in the central part of the county in the early nineties. Enos Ralston, of San Gregorio, whose family settled on Corte Madera Creek in the late fifties, tells of a grizzly which he and his small brothers and sisters surprised while they were gathering berries. The bear was on one side of a great redwood log and the children on the other. When the children climbed the log they saw the bear directly below. It is doubtful whether the children or the bear was the more frightened.

The valley quail is the prize game bird of San Mateo County. Excellent quail shooting may be had in many parts of the county, and there is promise of improvement because of the recent shortening of the season and reduction of bag limit. Quail have, however, become particularly wary in this district, and it is now difficult to secure a limit, in spite of the abundance of birds. When a few shots are fired the gun-wise birds take to the high brush, and here it is impossible to find them. Mountain quail were found in fair numbers in the higher elevations some years ago, but it is doubtful whether one could be found in the county today.

San Mateo has long been famous for its splendid rabbit shooting. Both cottontail and brush rabbits are found, but brush rabbits are by far the more numerous. Excellent cover is afforded these animals by the brush-covered hills on the coast-side of the county, and with reasonable protection, the rabbit will long afford a source of enjoyment to the man who enjoys getting out with gun and dog. Hundreds of rabbit hunters are in the field continually during the rabbit season. San Mateo was perhaps the first county to give the rabbit the protection of a close season. The law was found so beneficial that a similar one was later passed by the state.

The gray tree squirrel is no longer considered game in San Mateo County, although it is found more or less commonly throughout the wooded parts, and even within the incorporated limits of the cities along the bay shore.

Marsh shooting has not improved during recent years. The salt ponds on the bay shore formerly afforded excellent duck shooting, but in recent years ducks have become noticeably scarce. In the morning and evening during the fall there is still an excellent flight of ducks between the Spring Valley lakes and the bay, but shooting is limited to a few moments at these times of the day, and it is difficult to get more than a few birds. Better bags of ducks are secured by hunters skilled in the use of the skulling oar, but this sort of hunting is rather hard work for the average person and is not commonly resorted to.

Rail shooting was formerly one of the sports of the county, but so much land has been reclaimed during the past few years that rail have been greatly reduced and it has become necessary to close the season on them. It is probable that in a few years these birds will have increased to such an extent that a short open season can be declared. The clapper rail is one of the best of table birds and is preferred by many to any other variety of game.

Of all the attractions of San Mateo County perhaps the foremost is its trout fishing. Miles and miles of excellent trout streams are easily accessible. Many of these streams are classics with the angling fraternity: it is only necessary to mention the Purissima, San Gregorio, Pescadero, Butano, or any of the other well-known streams to the clan to start the ball a-rolling, or more particularly, the reel a-spinning; and stories are told of the wonderful creels of fish that have been taken.

The streams of San Mateo County have been stocked by the Fish and Game Commission with thousands of lively fingerlings. The following is a record of the plantings since 1912:

1912—	150,000	steelhead trout.
	6,000	eastern brook trout.
	114,000	rainbow trout.
1913—	117,000	steelhead trout.
	48,000	rainbow trout.
1914—	274,000	steelhead trout.
	20,000	rainbow trout.
	4,000	eastern brook trout.
1915—	400,000	steelhead trout.
	80,000	rainbow trout.
Total	1,213,000	

In normal years the streams are stocked also by trout from the ocean that spawn naturally, so that, though the streams are heavily fished, there should be an abundance for everyone.

The ocean shore of San Mateo County is to many the point of greatest attraction. At low tide scores of residents and visitors from San Francisco find their way to the rocky reefs where the clam, mussel, and abalone grow. During the seasons when the smelt are spawning they run close to shore and are then taken by the sackful. Fresh smelt are deemed by many superior to trout. Salt water eel are also abundant along the rocky shore. The crabs of the San Mateo beaches are unsurpassed in flavor and are found in enormous quantities.

In addition to the planting of thousands of fish in the county, the Fish and Game Commission has maintained a constant patrol to guard against game and fish law violations. During the past four years $10,596 was expended for patrol service, 231 arrests were made, and a total of $4,120 collected in fines. The amount realized from hunting and angling licenses approximates $5,955. The expenditures of the Commission on fish planting and patrol service is, therefore, greatly in excess of the money derived from the county, but the fact must of course be taken into consideration that money collected for licenses in San Francisco and other large cities is used in the fields and streams where the hunters from these points find their sport.

SHOOTING QUAIL FOR MARKET IN SAN MATEO COUNTY.

By F. B. Ralston.

In 1861 my father, John Ralston, trapped quail on and around the old home ranch on the Corte Madera Creek, where he had located three years before. He captured sixty dozen birds in his traps, and confined them in cages built of split redwood, but being offered only 25 cents a dozen in San Francisco, the one available market, he tore open the cages and set the birds free.

I began shooting for market in 1868, using a muzzle-loader, but it was not until ten years later that I did any wing shooting. At that time I met a Mr. Johnson, who was a wing-shot as well as a "ground sluicer" and who was out shooting birds for market. He asked me to take one side of a ravine and shoot it out, while he took the other with a breechloader. Though I was no shot on the wing, I took my side, and to my own surprise dropped the first three birds that rose. This gave me courage, but I soon found that to stop and load my muzzle-loader was too slow. The advantage of a breech-loader was apparent by my friend's success, and I immediately purchased a breech-loader and began wing shooting.

In those years we hunted six months open season. I used a fourteen-gauge Parker shotgun, and with a single load in this gun I have killed 26, and by using both barrels, 29 quail. My highest record on ground shooting was 192 quail killed in seven shots; on wing and ground shooting in any one day 121 birds, and on straight wing shooting 106 birds out of 129 shots. This last record was made in an ideal place in grass left by the reaper alongside of a narrow willow run three-fourths of a mile in length.

Mr. Johnson, as evidence of the abundance of quail in this part of San Mateo County in the early days, states that he bagged five dozen birds while walking from his home to the stage station at San Gregorio, a distance of a few miles.

It was not until about 1869, when the Chinese flocked into this great quail section and began grubbing and clearing the hills and flats, that quail began to lessen in number. They were thus driven out of their feeding and watering places, away from cover and protection, and cattle and horses, in feeding on the wild grass, exposed and destroyed their nesting places, contributing largely to the decrease of the next few years.

CALIFORNIA FISH AND GAME

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

October 18, 1916.

"Conservation is the order of the day; it is in the air; it stands for the prevention of waste, for efficiency and progress."

OUR SECOND BIRTHDAY

With this issue the second volume of CALIFORNIA FISH AND GAME is completed. Though the publication of this quarterly has necessitated an annual expenditure of several hundred dollars, the results obtained more than justify this outlay. If knowledge of the need and value of wild life conservation is a prerequisite to the preservation of our fish and game resources, then the most economical and effective method of bringing this about is being used. A man employed to make personal calls at five dollars per day could not interview more than eight people daily. A lecturer would find it difficult to reach regularly more than one hundred people during each working day. Only a portion of the people so reached would be convinced of the needs of wild life, for the spoken word is discounted more than the written word. CALIFORNIA FISH AND GAME has been received by close to five thousand people every three months. The large number of complimentary letters received, and the growing mailing list, indicate that the magazine does not find its way to the waste basket, but is read with interest and profit.

The Shad Number and the Deer Number were so well received that several special numbers such as these will be issued this coming year. We are also glad to announce that a series of colored plates of game birds and game fishes will appear in forthcoming numbers. These plates are four-color reproductions of paintings by Louis Agassiz Fuertes and Charles Bradford Hudson and will be suitable for framing.

N.B.—In order to bring the mailing list up to date we are enclosing in each copy of the October number a card which everyone interested in receiving the quarterly should fill out and return promptly. Unless this card is received before the next number is ready for mailing, the name of the recipient will be removed from the mailing list.

A NEW DEPARTMENT.

All notes relating to hatcheries and fish culture will hereafter appear in a separate department under the heading "Hatchery Notes." The department will be edited by Mr. W. H. Shebley, In Charge Fish Culture. Mr. N. B. Scofield will continue to edit the department: "Commercial Fishery Notes." Mr. L. H. Whiteman, In Charge Information, United States Forest Service, is editing the department: "United States Forest Service Co-operation."

A CHAIN OF GAME REFUGES FOR CALIFORNIA.

Believing that a chain of game sanctuaries can best insure our game supply, the Fish and Game Commission is co-operating with the United States Forest Service in gathering data relative to suitable situations for game refuges within the national forests. The supervisors of the various national forests have recommended twenty-two new refuges comprising a total area of 925,125 acres. Five supervisors are opposed to the creation of refuges in their respective forests, but all of the rest recommended one or more areas.

Some of the areas recommended are too large and others will not be available for other reasons. Nevertheless, when the present plans are worked out, a chain of sanctuaries extending from San Diego County to Siskiyou County will be established, either by federal enactment, if the Chamberlain-Hayden bill is passed by Congress, or by state enactment at the next session of the legislature.

Fig. 68. A high mountain lake. Trout have been planted in practically every lake of this size in the high Sierras.

FISHING POPULAR.

The opening of the fishing season last spring showed that angling is becoming more and more popular. As evidence of the large number of fishermen in the field on the opening day, the following is of interest. Deputy Hoen counted 199 fishermen on Paper Mill Creek, in Marin County. At least 485 special permits were given to fishermen desiring to try their luck in Wild Horse Lake by the Water Company of Vallejo. Deputy Armstrong reported 220 men at the lake on the opening day, and a catch of about 1,800 pounds of trout.

GAME RESOURCES OF CALIFORNIA ADVERTISED BY FOREST SERVICE.

The United States Forest Service has issued recreation maps of the different national forests of California for the use of campers and travelers. The maps show the principal mountains, streams, settlements, etc., of each forest, and also the best camp grounds and localities where deer, bear and other game are abundant. On the back of each map is information regarding the location of the forest, history and purposes, administration, physiography and resources, climatic conditions, fishing and hunting, aid to campers, horse feed and supplies, hotels and suggested trips. On the back of the Trinity National Forest map, for instance, the fishing and hunting conditions are thus described:

"The Trinity National Forest is considered a paradise for sportsmen. Streams and lakes are well stocked with trout. In the south fork of the Trinity River the salmon fishing is excellent. Small game, quail, grouse, squirrel, and rabbits are plentiful almost everywhere. Deer, bears, and panthers are found in the more isolated regions. In the southern part of the Forest, the best game region, is located the Trinity Game Refuge. In this refuge, established by the State of California, hunting is forbidden, and predatory animals can be killed only by permission of the State Fish and Game Commission. Deer are so plentiful here that they may be seen at any time, and even photographed about the salt licks."

Information as to the distribution of trout in 1912, 1913, and 1915, as to the securing of fishing licenses, and excerpts from the fish and game laws follow.

RANCHERS PROTECT GAME.

A number of ranch owners in this state are improving game conditions by making game refuges of their property. A recent instance is afforded by the Marshall ranch, owned by A. H. Marshall, comprising 400 acres in Trinity County. No one is allowed to kill any bird or animal, except predatory animals, at any time, either in or out of season; nor does the excuse that wild birds or animals are damaging crops allow this rule to be infringed upon.

THE CAMPAIGN AGAINST THE ENGLISH SPARROW.

As a result of the publicity campaign begun by the commission, a number of cities have instituted control measures. The latest report from the officially appointed sparrow destroyer of San Diego is to the effect that 415 European house sparrows, more commonly known as "English sparrows," have been killed, and it is estimated that not more than 20 sparrows still remain in the city. That the greater portion of these bird pests have been destroyed in San Diego is evidenced by additional reports from interested parties. According to newspaper reports the cities of Riverside and Redlands have also instituted campaigns and have appointed official sparrow destroyers. Sacramento will probably be the first city in northern California to inaugurate control measures.

REGULATIONS FOR THE PROTECTION OF MIGRATORY BIRDS.

New federal regulations for the protection of migratory and insectivorous birds were issued August 21, 1916. One change in the law is unfortunate and will have the effect of losing for the law some of the support which it would otherwise have obtained. The opening of the season on waterfowl is extended to October 16th. Since California laws were made to conform to the former regulations the open season on waterfowl begins on October 15th, according to state law. A protest against this change has been sent to the proper authorities, but there is little hope that resultant confusion will be avoided on the opening day.

The other change is to be commended. All shore birds with the exception of the Wilson snipe, are to be protected until September 1, 1918. This eliminates the shooting of golden and black-breasted plover and greater and lesser yellowlegs. Since but few shoot these birds, and since the need of additional protection for them is evident, there will doubtless be a willing observance of this provision in this state.

Fig. 69 A catch of rainbow trout on the north fork of the Feather River. Photograph by F. A. Farnum.

The Senate's approval the last of August of the treaty with Canada, which provides for like protection of migratory birds in both countries, will have a direct bearing on the constitutionality of the federal law.

STATEMENT OF THE FEDERAL ADVISORY COMMITTEE OF THE MIGRATORY BIRD LAW.

The members of the Advisory Committee to the Department of Agriculture on the Migratory Bird Law, in view of the fact that new regulations setting forth closed seasons on migratory waterfowl and birds were made public August 21, 1916, have given out the following statement:

To The People of the United States:

The Advisory Committee appointed by the Secretary of Agriculture, Hon. D. F. Houston, to co-operate with the Bureau of Biological Survey in fixing the regulations for closed seasons on migratory birds, as authorized by the Federal Migratory Bird Law, desires to state to the people of the country that after the most exhaustive investigation and the most careful consideration of every point raised, the regulations as promulgated were unanimously recommended by the members of this committee. We realize the utter impossibility of even attempting to satisfy all that desire to shoot migratory birds.

In recommending the regulations we were controlled by the following considerations:

First—A most earnest desire to save from certain depletion and threatened annihilation the valuable waterfowl, game and insectivorous birds which migrate across the United States twice each year.

Second—To accord the hunters in the various states as nearly as possible an equal opportunity of taking migratory waterfowl and nomadic game birds.

Third—To open the seasons during which these birds can be legally killed in those months when under normal weather and food conditions the largest number of migratory waterfowl and birds sojourn in any particular state.

Fourth—To absolutely eliminate spring shooting, when migratory waterfowl and birds on the northward migration are journeying towards their breeding grounds, thus impelled by the resistless force of nature, to mate, nest and reproduce their species.

Fifth—To recognize unusual and extraordinary conditions existing in a few of the states, without affecting the equity or vested rights of the people of the whole country in the migratory wild life.

Sixth—To submit reasonable, practical, fair and just regulations that should invite the support of all true conservationists.

Seventh—To guarantee not only to the present generation a reasonable supply of migratory wild life, but to so protect it that it will multiply and be handed to future generations as their proper and rightful heritage.

The imperative necessity for the enactment of the federal migratory bird law is palpable to every thoughtful and discerning mind.

Migratory wild life does not even recognize national, to say nothing of state, lines. The variability of the statutes of the states protecting these migrants, the lack of uniformity in these laws, the rapacity with which the nomadic birds are slaughtered by voracious annihilators of wild life in many of the states to the detriment of the people at large, compelled the conclusion of Congress that the exigencies of the situation demanded federal regulations that would, in reality, save the migratory waterfowl and birds from extermination.

The people of no country have been so abundantly blessed with valuable natural resources as ours.

The American people are notoriously a nation of wasters. Only by reason of the fact that their natural resources are fast disappearing have they been induced to extend even a modicum of conservation to these fast-vanishing assets.

Conservation does not mean preventing the use of our natural resources as a miser would hoard his gold, but means the wise and careful use of our national heritage, taking therefrom only a sufficient quantity to supply our needs, with the full realization that we are trustees for future generations.

We are convinced that under the operation of this law shooting will improve each year.

The need of the hour has heretofore appeared to be uppermost in the minds of the people. They have drawn recklessly on their natural inheritance with scarcely a thought of the future. It is a notable fact that in our rapacity for slaughter many of the most valuable species of game and birds that formerly abounded in this country have been annihilated.

The wild or passenger pigeon that formerly swarmed over eastern North America in countless millions has become extinct. The American bison, found on the great plains of the West, was slaughtered by hide hunters to the point of extermination. The great auk, the Eskimo curlew, the Labrador duck, the Carolina parrakeet, have been exterminated. There are many other valuable North American birds that are candidates for extinction, including the whooping crane, trumpeter swan, American flamingo, roseate spoonbill, scarlet ibis, long-billed cur-

hen, upland plover, Hudsonian godwit, red-breasted sandpiper, golden plover, dowitcher, willet, pectoral sandpiper, black-capped petrel, American egret, snowy egret, wood duck, band-tailed pigeon, Anthony's tern, sage grouse, white-tailed kite, prairie sharptail, pinnated grouse and woodcock.

Future eventuations can only be judged by those that have gone before, hence the enactment and the enforcement of a comprehensive system of federal conservation of migratory wild life was made necessary if this valuable asset was to be retained among the resources of the United States.

Aside from æsthetic consideration, birds and game constitute a valuable article of food. From a recreational standpoint, this resource is of the greatest value to our people.

We feel that the failure of any American citizen to accord the federal migratory bird law his most active support is due either to lack of information or selfishness.

We therefore urge and request all patriotic citizens to exert their influence to the utmost to the end that the incalculable benefits contemplated by this law, and most specifically accruing to the people under the regulations just promulgated, be given their moral support, that the enlightened conscience of the people may be quickened to a full observance and vigilant enforcement of this wise and progressive conservation measure.

JOHN B. BURNHAM, N. Y., Chairman.
HON. EDW. G. BRADFORD, JR., Dela.
HON. F. W. CHAMBERS, Utah.
W. L. FINLEY, Oregon.
DR. E. H. FORBUSH, Mass.
DR. GEO. B. GRINNELL, New York.
DR. WM. T. HORNADAY, New York.
CLARK MCADAMS, Missouri.
MARSHALL MCLEAN, New York.
CLINTON M. ODELL, Minn.
T. GILBERT PEARSON, New York.
HON. ERNEST SCHAEFFLER, Cal.
HON. GEO. SHIRAS, 3D, Mich.
HON. JOHN H. WALLACE, JR., Ala.

THE CHAMBERLAIN-HAYDEN GAME SANCTUARY BILL.

The Permanent Wild Life Protection Fund has been making every effort to force the passage of the Chamberlain-Hayden Game Sanctuary Bill. The bill has been acted upon favorably by both the Senate and the House committees, but the pressure of business during the closing session has, up to September 1, prevented the bill being brought to a vote. It is reported that in the Senate the situation is satisfactory, in spite of the fact that four senators are opposed to the bill. Conditions in the House of Representatives, however, are not nearly so good, and all those interested in the bill are being asked to urge their congressmen to bring the bill to a vote under a suspension of the rules, as soon as possible.

This Sanctuary Bill has been endorsed by an ex-president of the United States, by twelve state governors, by fifteen state game commissioners and state game wardens, by dozens of high state officers, by the presidents and professors of seven western state universities, by scores of organizations of sportsmen, zoologists, stockmen and businessmen, by clubs and societies of many kinds, by practically all of the national organizations for the protection of wild life, by dozens of influential newspapers and magazines, and by thousands of unattached citizens of prominence who have declared in writing their endorsement and support. The great Order of Elks, also, at its grand annual conclave, gave this cause a ringing endorsement and appointed a special committee to press the matter before Congress without delay.

In defense of the bill the following statements are made: "This bill would take nothing from the public domain! It would not change the legal status of one acre of public land, except by protecting the game upon it from being killed.

"It would sequestrate no agricultural lands and no grazing lands! The areas in view for these sanctuaries are the wild, remote, rugged and now useless regions, utterly useless for agriculture and for grazing. Any settler who goes into such a region to live is doomed to perpetual poverty because he can not conquer steep mountainsides and V-shaped valleys.

"This matter is proposed to Congress on a basis of absolute good faith. It is not intended as an 'entering wedge' for big new appropriations and a lot of new high-salaried positions; but eventually it will cost about $20,000 per year of extra money. If the plan is not worth $20,000 per year, it is not worth considering. We call it real, constructive conservation, on a large scale, at practically no extra cost.

"If at any time the people of the United States decide that the public welfare demands the breaking up of the national forests, and their opening to settlement and land speculation, then 'let the tail go with the hide,' and deconsecrate and break up the game sanctuaries

at the same time. The East can stand it if the West can; and there is nothing in the proposed law that can prevent its repeal.

"In the states that will be affected by the proposed game sanctuary plan, there are probably 1,000,000 men and boys who go hunting each year, and kill game—if they can find any! To them this bill means a continuation of legitimate sport; and state control alone means the extermination of big-game hunting in the near future. These are hard facts, not theories; and the American people can take them or leave them."

Fig. 70. Child feeding pet deer. Photograph by Mrs. H. M. Sharp.

AN INDIAN'S VIEW OF BURNING, AND A REPLY.

[The Fish and Game Commission recently received an interesting letter, purporting to be written by an Indian of Del Norte County, which contained a plea for the burning of forest areas to destroy pests and renew growth. The United States Forest Service has furnished an answer. Both letters are here published because they entertainingly express in informal English two opposing views of a mooted question—EDITOR.]

REDTA, Cal.,
May 27, 1916.

Fish and Game Commission,
San Francisco, Cal.

DEAR SIR: Long time before White Man come, Indians eat fish, acorns and deer meat, that's all. He gets just what he wants to eat. Eat 'um fresh in summer time smoke 'um for after awhile when winter come. Deer, elk and bear him eat grass, young brush and acorn and wild berry. Every winter too much wet so everything grow very fast; you see White Man he cut out all old wood on berry bushes and on fruit trees, because he know berry and fruit tree grow much large on new wood, more than old wood, he know bug eat leaf and worm get in fruit and make 'um no good for eat; well you see Indian know all this too because long time before White Man come, Indian here. White Man he take care of what he plant and what he use. White Man he have time every year to cut out old wood and make lots of big berry and fruit grow, for what he wants to eat, but he forget to fix mountain land for elk, bear and deer to eat. WHY HE DON'T KNOW SAME 'BOUT FOREST? White man cut brush in pasture so grass grow for stock to eat; but Indian no have berry

bush and fruit tree to plant so he have to fix all wild berry bush and fruit tree and make brush stop so not choke grass. Indian have no medicine to put on all places where bug and worm are, so he burn; every year Indian burn. Fire burn off old wood on berry bush make new wood grow and lots big berry come.

Fire burn up old acorn that fall on ground. Old acorn on ground have lots worm; no burn old acorn, no burn old bark, old leaves, bugs and worms come more every year. Fire make new sprout for deer and elk to eat and kill lots brush so always have plenty open grass land for grass. No fire brush grow quick and after while choke out all grass and make too much shade, then grass get sour, no good for eat. No fire then too much leaf stay on ground, no grass can grow up, too much dead leaf, ground get sour. Indian burn every year just same, so keep all ground clean, no bark, no dead leaf, no old wood on ground, no old wood on brush, so no bug can stay to eat leaf and no worm can stay to eat berry and acorn. Not much on ground to make hot fire so never hurt big trees, where fire burn. Now White Man never burn; he pass law to stop all fire in forest and wild pasture and all time he keep right on cutting out old wood on berry bush and fruit tree and cut brush off grass land and put medicine to kill worms and bugs. WHY HE SO LET FIRE DO SAME IN FOREST AS HE DO TO BERRY BUSH AND FRUIT TREE? White man say he don't understand why wild berry get small and more few every year and acorn all get wormy, and no more grass land, and why deer die when they eat sour grass, under brush and tree, made sour by too much shade.

Indian know, and bye-un-bye White Man say he know too, but Indian say, WHITE MAN YOU KNOW TOO LATE.

Yours truly,

(Signed) KLAMATH RIVER JACK.

DEAR JACK:

A while back you wrote a letter to the man in San Francisco who is the Boss of the Outfit that takes care of the deer and the fish and the birds. You told him how things were in the woods and the mountains before the white man came along. You asked lots of questions too, Jack, and I want to tell you why the white man does things like you say.

We won't get into any college debate and use dictionary words; let's start with the main thing, grub. You eat deer meat, fish and acorns. You want lots of these things, so to keep the supply going you set fires in the woods. They burn over a big country and then next spring you see lots of new shoots on the brush; manzanita, scrub oak, snowbrush and all the rest of them. But you don't see any shoots on the little pines and firs, do you? No! They are dry and dead; all of them up to about twenty feet high. Maybe that don't mean anything to you because the pine tree ain't good feed for deer. But I want to tell why it does mean something to you and to the deer, too.

You say that the white man prunes his bushes to make them grow better—that's true. You say that the Indian prunes his wild bushes with fire and he gets the same results—that's true. But, Jack, do you want the brush to grow so thick? Most Indians say no. They want to ride through the woods without having to fight their way through brush. Now, the two best friends the thick, heavy brush has got are sun and fire. When the fire runs through, it burns the old wood on the brush and in the spring there are ten little stalks started where there were only two before. But at the same time all the young pine trees are killed. Then there is not much left to throw shade on the brush and after a few years living in the open sun the brush field is lots thicker than it ever was before and there is no grass and the deer are forced to go back under the heavy timber where the ground is open.

Of course that fire didn't burn the big pine trees, but how long do you think those big trees are going to live?—not a great many years. And when they die there are no trees to take their places because you burnt all the little trees while they were growing up. And then there will be nothing but brush fields and no shade for man and deer to travel in and no grass because the brush is so thick. Now, what would have happened if there had been no fire? The little pine trees would have pushed their heads up over the brush and spread out their branches and thrown shade over the brush. As they got bigger and made lots of shade the brush would have got sick and finally died out just like a flower that you try to make grow in a tin can in your dark cabin. And why is this? Just because brush can not stand shade.

Not long ago I went over to Frank Long's to offer him a job on the White Horse Road. Thought I'd make a cut-off and save some time so I rode up the ridge back of Adam's cabin and figured to cut across Elk Creek Canyon. I was in the open timber all the way until I started down the side of the canyon and ran plumb into that long brush field you can see from the river. You know, the one that runs from the Queen Mine flume clear to the top of the mountain. I tried to jam through it but couldn't make it, so had to ride clear up and around the brush.

Did you ever stop to think what made that brush field? Do you know that all through it there are old black stumps burned clear into the ground? Fire did it. When I asked Frank about it he said that three big fires had run over that place in the last 20 years. Are there any berries in that strip; is there any grass in there; can you hunt in there? No, Jack, because your fire is bad medicine. If that place had been left alone

there would be big timber all over it and you could ride anywhere and there would be lots of grass on the ground for deer and cattle.

And, Jack, if your acorns are wormy, don't blame it on the white man keeping fire out of the country—there are a good many other things that keep bugs alive. And I have seen the best kind of acorn crops in places that never felt a fire. Anyway, there are other things that make better flour than acorns; why not plant some grain and vegetables and fruit trees on that flat back of your cabin? That's white man's grub, but its pretty good.

Yours truly,
(Signed) JIM CASEY.
Forest Ranger.

BRITISH COLUMBIA HAS ESTABLISHED THE HUNGARIAN PARTRIDGE.

In contrast with the general failure to establish the Hungarian or European partridge in the United States is the success attained in British Columbia. A recent report states that an open season of two days was declared on these birds last year. On November 13 and 14, 1915, shooting was allowed in the Delta District. Many hunters were in the field, but only small bags were obtained. Probably between 400 and 500 birds were killed. If conditions are satisfactory another open season of two days will be declared next year.

OBTAIN AN AUTHORITATIVE WORK ON PHEASANT BREEDING FREE.

Through the courtesy of the American Game Protective Association we are enabled to offer free of charge to game breeders in this state a limited number of copies of E. A. Quarles' authoritative work "American Pheasant Breeding and Shooting." The book, based on the experience of the most successful breeders in the United States, gives detailed information on the hatching and rearing of pheasants and is illustrated with fifty half tones. Everyone engaged in pheasant breeding and everyone who contemplates rearing these birds should possess a copy of this book. Make application to Bureau of Education, Publicity and Research, Museum of Vertebrate Zoology, Berkeley, Cal., and include six cents in stamps to cover postage.

FOUR CLASSES OF VIOLATORS.

In the American Game Protective Association's Bulletin of February 15, 1916, there appeared the following:

"Violators of game laws may be divided into three general classes:

"The young.
"The ignorant.
"The thoughtless.

Fig. 71. Commissioner Westerfeld, Attorney Duke and Deputy Ober crossing pass on way to Rae Lakes, August 16, 1916. Photograph by J. L. Von Blon.

"Education, and the creation of a sentiment which will make a man ashamed of himself for taking what does not belong to him, are the two weapons with which all of these classes must be opposed. Organization is the medium through which these weapons can be most successfully used."

To these three classes should be added a fourth—the willful. We regret to say that there are many belonging to this class in our state. The men who persist in exceeding the limit on ducks because a game warden is not at hand and the men who continue to hunt for deer, ostensibly "for the outdoor exercise," after having procured two bucks, are willful violators and can not even be classified among the "thoughtless." Those of this class, more than those of any other, need the stern hand of the law as an educational force.

CLUB URGES PROTECTION OF HARMLESS SNAKES.

The Lorquin Natural History Club of the Southwest Museum, Los Angeles, California, has been placing neat signs of tin in many places in the mountains urging the protection of harmless snakes.

A record of the altitude at which each sign is placed draws the attention of those who might not otherwise read the inscription which is as follows:

> **DO NOT KILL HARMLESS SNAKES.**
>
> THEY DESTROY DISEASE-BEARING RODENT PESTS.
>
> THE ONLY HARMFUL SNAKES IN CALIFORNIA ARE RATTLESNAKES
>
> Altitude ———.

A WARDEN'S DUTIES IN PENNSYLVANIA.

According to Dr. Joseph Kalbfus, executive officer of the Pennsylvania Fish and Game Commission, the duties of the fifty paid game protectors in Pennsylvania is not only to arrest men who may violate the law, but to keep in touch with the people, that they may understand what game protection means; to locate game of various kinds; to feed game and wild birds when necessity requires; to assist in every way in the extermination of vermin; to destroy dogs that are out of place and in turn have become vermin; to extinguish forest fires, and to do such other things as may add to the protection of, and the increase of game and useful wild birds. Each game protector is paid a salary of $75.00 a month, in addition to traveling expenses.

A NEW DANGER TO BIRDS IN ENGLAND.

In England old-fashioned agriculturists are attempting to instigate a wholesale killing of the birds, based on the plea that in these times no share of the crops can be spared to birds.—*Current Items of Interest, April 11, 1916.*

SOME SUGGESTED CHANGES IN FISH AND GAME LAWS.

Some radical changes in our game laws are suggested in the following letter by one of our readers. Some of the points are well taken although all may not agree as to the desirability of many of the suggested changes.

Although I believe that our fish and game commissioners are doing what they think best for all, I believe that our laws should be made more strict and a tighter line drawn. It is my opinion that our daily bag limits on both waterfowl and upland game are in many cases too large and should be cut down. My reasons for wishing to see this change are these: The present bag limits permit a man to kill more than he can use himself, and allows him to distribute the surplus among his friends. It encourages him to slaughter, and encourages his friends to depend upon him for their supply of wild game.

Were the bag limit reduced to an amount sufficient only for a man's own needs, it would cause him to be appreciative of his privilege to hunt wild game, would take him out more frequently into the open, which would mean more to his health, and would give him more practice with a gun. On the other hand, the man who has been depending upon his friend for his game supply would be called upon to hunt for his own, thereby bringing others out into the open to get healthful exercise. It would also encourage the use of the gun, thereby making more and better marksmen to defend the country in time of trouble, and would help swell the state's fund through additional licenses.

Our present "district system," I believe should be abolished, thereby allowing a party killing game in one part of

the state to take it into another. Instead of dividing the state into districts certain sections and streams of each and every county should be closed to hunting and fishing for certain periods, say from one to three years at a time; then when these sections are opened other sections of the country should be closed, and so on. At the same time the present open and close seasons should prevail in the open sections. This would allow fish and game a splendid opportunity to breed and multiply unmolested in a district during the close season. And as hunters would not frequent the closed sections the game therein would become man-shy and thus afford plenty of sport to the hunter. This would in a short time give to this state a greater reputation as a game state than it has ever enjoyed and place good hunting within the easy reach of all.—CLIFTON A. WOOD.

FOR SELFISH REASONS.

The world is beautiful; only man is vile. Witness a shady bower in a beautiful mountain canyon on a hot summer's day. A clear, sparkling stream is trickling musically down over the shining pebbles or between moss-grown boulders; flowers are blooming; the ground under the trees is carpeted with ferns and tender grass; birds are warbling cheerfully and all is peace, repose and loveliness. Suddenly a crowd of picnickers come surging through the bushes and, spying our quiet nook, decide it is the ideal place for a picnic, so down go the lunch baskets, off come the coats and hats and the picnic is on, full blast.

The hot summer day passes, and when the cool evening hours come the picnic party gathers *some* of its belongings and starts for home. *Now* peep through the branches at our Eden. The vines are torn and broken, branches pulled off of the trees lie scattered hither and yon; cardboard pie plates cling to the wild-rose bushes or repose unblushing in beds of moss; a broken wicker basket is dangling from a tree branch; a gaudy catsup bottle stands guard over an old shoe box and some banana peelings, while an empty bean can graces the edge of our crystal stream. Gone now is the charm of our woodland bower, disorder reigns where beauty once held sway. Small wonder then that the birds and squirrels voice their remonstrance in complaining accents. Nature will be long in repairing the damage so carelessly done.

When it is our pleasure to visit one of nature's Edens, let us remember that some day, others may want to enjoy it as we are enjoying it now, or let us remember that we ourselves may some time wish to return, so, for purely selfish reasons, let's bury the cans, papers, and peelings, then go our way knowing that nature will turn these unsightly things into flowers and grass and ferns to refresh and gladden us on some other summer's day.—JOS. A. BEEK.

DO CORMORANTS EAT FISH?

Cormorants, or shags, are continually accused of destroying quantities of food fish. The following quotations taken from a paper by P. A. Taverner of the Canadian Geological Survey are of particular interest in that they bring out the results of an investigation into the relation of the double-crested cormorant (*Phalacrocorax auritus*) to the salmon industries on the Gulf of St. Lawrence (Canada Department of Mines, Museum Bull. No. 13, pp. 1–24). We can not say whether our species of cormorants prey upon salmon, but it seems probable that many of the stories in circulation are as exaggerated as those which led to the investigation carried on in eastern Canada.

"Evidence apparently against the cormorants is not wanting. Knowing that all the salmon smolt must pass through the estuarine mouths of the rivers to the sea and again repass them when ascending as grilse the presence of numbers of fish-eating birds of itself is disturbing enough, but when one hears from reliable sources that some twenty-seven fingerling salmon (parr) have been taken from the crop of one cormorant, the evidence superficially looks alarming. Investigation, however, shows that these constantly reported tales are variants of a few cases so often repeated as to greatly exaggerate their importance and hide their exceptional character. But all cormorants found on the upper reaches of the rivers must, until other evidence is forthcoming, be assumed to eat salmon, as they and a few trout are practically the only fish the waters contain.

"On the coast, about Percé, the cormorants certainly do the fishermen a certain amount of injury. It is not the salmon industries that are affected here, but the cod-fishing. During a large part of the season the codfishers rely altogether upon herring for bait and for this purpose the herring nets are set nightly. When these fish are abundant the toll taken by cormorants is not noticeable, but when, as regularly occurs, herring are scarce, the

birds go to the nets and help themselves to the contents. The few herring they take are on the whole only a big-grabful; but when half a dozen small fish is all that can be expected from a net to serve for a day's fishing, and half or more are taken by cormorants, the fishermen can hardly be criticized for giving vent to some evidences of discontent at the loss of a day's work and profit. However, though the fishermen do look upon the cormorants as one of their natural enemies, they do not seem to be bitter against them; not nearly as much so as the salmon anglers; who only have a sporting interest in their fish and are not dependent upon them for a livelihood.

"The population of fry produced by the birth rate is greater than can be raised and the surplus must necessarily be reduced, if not by one agent, then by another. There is a point to be reached when even an immense increase in the number of fry introduced into the streams will be ineffective in increasing the output of smolt. As the birth rate has been evolved under present conditions of food supply and enemy factors, the natural conclusion is, that the kingfishers and the shelldrakes are compensated for in it. The natural increase was sufficient to stock the river in the past to abundance, in spite of these enemies, and there is no reason to suspect that it is less effective now. Hence, if man introduces sufficient fry to compensate for the ova that should be laid by the breeding fish he captures, probably the highest possible efficiency of the streams under the present food conditions will be reached. If this is done the shelldrakes and kingfishers can be neglected except to see that they do not increase to an abnormal extent.

"In conclusion it may be said that

I. The total effect of bird enemies upon salmon is small, if any.

II. Hatcheries and fry planting will compensate for the toll of mature fish taken by man.

III. The number of smolt that go to sea is dependent upon the food supply in the streams.

IV. The number of returning salmon is governed by the extent of their deep sea habitat and the number of enemies there.

V. While planting may return an exhausted stream to its normal capacity, the number of fish can not be indefinitely increased, without a readjustment of other critical conditions.

VI. Eliminating the question of poaching, stream defilement, and other abnormal conditions, the problem of increasing the salmon run in the rivers, above the natural capacity of the streams, lies between increasing the parr food in them or reducing the enemies of the salmon in the deep sea habitat."

GAME BIRDS FOR SALE.

The stock of game birds at present held on the State Game Farm at Hayward will be sold at reasonable prices to game breeders. The species represented are: ring-necked, golden and silver pheasants and valley quail. Ducks of the following species are also offered: mallard, pintail, spoonbill, cinnamon teal, green-winged teal and fulvous tree-ducks. Apply to Superintendent, State Game Farm, Hayward, Cal., for prices.

HATCHERY NOTES.

W. H. Shebley, Editor.

THE SHAD HATCHERY AT YUBA CITY.

The shad hatchery at Yuba City was closed August 1st, after experimenting and studying the movements of shad in the Sacramento and Feather rivers for three months. The work was under the supervision of Superintendent G. H. Lambson, Field Agent, E. W. Hunt and Mr. George Neale of the Sacramento District Office, who assisted this department with his knowledge of the movements of the shad, in making arrangements with the fishermen to catch the fish, and in many other details. The run of shad was scattered, owing to the heavy fishing on the lower river which broke up the schools, and the extremely cold and roily water this spring and early summer caused by the melting of the deep snow that fell in the mountain regions last winter. The operations carried on were of considerable value in preparing for future shad hatching. Shad fry to the number of 872,000 were distributed in the Feather River.

The experiments in fertilizing and hatching a high percentage of the eggs and in keeping them free from fungus or bacterial infection were successful. The avoidance of bacterial infection is very important in propagating eggs of shad and striped bass. While no shipments were made East, experiments made in holding the eggs for shipment demonstrated that they can be successfully shipped to eastern hatcheries in shipping cases. Next season it will be possible to furnish Massachusetts and Connecticut with shad eggs for their hatcheries, as well as to hatch a liberal supply for our rivers.

The excessive fishing on the lower reaches of the Sacramento River, and in the bays, has greatly depleted the number of shad, and it is now necessary to hatch in streams of Mendocino, Sonoma and Lake counties.

The distribution of fry from the Fort Seward Hatchery, Humboldt County, was completed August 20th. This was the first season's work at this station and the results are very satisfactory. The water proved to be all that was predicted for it when the station was first built. There was an ample supply of pure cold water during the warmest days, and the fish were unusually healthy and vigorous. One million one hundred and fifty-three thousand fry were distributed this season along the line of the Northwestern Pacific Railroad from Fort Seward Hatchery. Plans are being made to collect enough salmon eggs from Eel River near Fort Seward Hatchery to furnish that station with salmon eggs this season.

Fig. 72. Eel River near Steelhead, where salmon egg collecting station will be established in October. Photograph by S. Campbell.

and rear the shad if we desire to keep up the supply. Next season a well-equipped shad hatchery should be run on the Sacramento River and the Department of Fish Culture is ready to go ahead with the work.

TROUT FRY DISTRIBUTION, 1916.

Distribution of trout fry has been in progress at the different hatcheries since May. At Ukiah hatchery the fish were all planted by July 31st. Steelhead trout to the number of 445,000 were distributed

During July, the hatchery department made arrangements to establish a small hatchery and an egg collecting station at Lake Almanor Dam and one at Domingo Springs to collect rainbow trout eggs from Rice Creek, a tributary to the North Fork of the Feather River. This work is now under way and it is expected that it will be completed by the last of September. All the trap material, tanks, live cars, and egg collecting apparatus, will be stored ready for use early next spring.

The distribution of fry at the Almanor Hatchery was completed on July 31st.

Operations were very satisfactory. Over 200,000 rainbow trout fry were distributed in waters tributary to the North Fork of the Feather River in Lassen and Plumas counties. In addition to the fry reared and distributed from this station, 1,285,000 rainbow eggs were shipped to other stations, to be reared and distributed in other sections of the state.

Bear Valley Hatchery was closed on August 20th, after a successful season, considering the disadvantages that the crew worked under when the station was opened last March. Considerable difficulty was had in fertilizing the eggs, owing to the over retention of the eggs by the female trout, caused by the debris-choked mouths of the creeks which the fish enter to spawn. The crew had to remove the drifts and sand bars at the mouths of the creeks before the fish could enter. The fish were late in entering the streams where the traps were located and consequently the first fish to be taken were in poor condition for spawners. Seven hundred and fifty thousand fry were hatched and distributed in good condition in the waters of San Bernardino County. Deputy Malone ably assisted our men in the work of distribution. It is planned to operate this station on a larger scale next season.

Two distribution cars have been busy distributing the fish from Sisson station, which this season are being given a wider distribution than ever. When the season's work is over at Sisson station, nine million five hundred thousand large, fine trout fry will have been planted throughout the state.

The fry from Brookdale Hatchery were all distributed by August 1st, after a very successful season. Eight hundred seventy-five thousand fry were distributed throughout Santa Clara, Santa Cruz and Monterey counties.

Tallac hatchery was closed on August 1st. Owing to the warm and bad condition of the water at this station, it is necessary to plant the fry early. The fry were given a wide distribution and will make a good showing in due time. The Tallac Hatchery should be removed to a site on Tallac Creek, as the present site on Taylor Creek is not suitable for holding fry to the desired age for planting. Plans are being considered to move this hatchery to a new site, where the fry can be held until late in the fall. A system of rearing tanks is proposed in addition to the hatchery, so that the fry can be reared to a larger size before planting than under the present system. It is hoped that this work may be completed before next season's operations begin.

Fig. 73. Exploring party on way to Rae Lakes Aug. 16, 1916. Photo by J. L. Von Blon.

The Tahoe Hatchery will run until October 15th, or later, to give the fry as much growth in the hatchery as possible before planting. The season at Tahoe has been a very successful one. In addition to the black-spotted trout fry usually hatched at this station, a quarter of a million rainbow from the Almanor egg collecting station were hatched. These will be distributed in places most suitable for this variety in the Tahoe region and Truckee River. This season there will be 3,000,000 trout fry distributed in the lakes and streams of the Tahoe district from the Tahoe hatcheries. In addition to this lot, 110,000 eggs were shipped to the Verdi Hatchery where they were hatched and reared. The fry resulting from these eggs will be distributed in the streams and lakes in the vicinity of Lake Tahoe.

NEW SCREEN AND LADDER SURVEYS.

Among important investigations that have been made in the screen work during the past three months, is the investigation of canals in Monterey and Santa Cruz counties, and in the Sutter Basin. Reclamation districts No. 1500, No. 108, and

Fig. 74. Rae Lakes with Fin Dome in the background. An egg collecting station for the Inyo Hatchery will be established here. Photograph by R. D. Duke.

EASTERN BROOK TROUT FRY OBTAINED IN NEVADA.

Our supply of eastern brook trout fry was increased considerably this season, as the Nevada State Fish Commission did not operate their hatcheries and we were able to secure the privilege of collecting eggs from Marlett Lake, Nevada. The Carson City Hatchery was taken over by the California Fish and Game Commission and the Eastern brook trout eggs collected from Marlett Lake were shipped to the Carson hatchery, where they were eyed and prepared for shipment. At this station 690,000 eggs were collected, 527,000 of which were shipped to Sisson Hatchery to be hatched and reared for distribution in the streams of California.

No. 787 have been properly screened to prevent the passage of fish through the large siphon pipes. Screen investigations have also been carried on in Modoc, Amador, Tuolumne, Alpine, Mono and Inyo counties.

Surveys have been made for a new ladder over the Floriston Dam in the Truckee River, the property of the Crown-Willamette Paper Company; the Gibralter Dam in San Ynez River, Santa Barbara County; the dam of the Santa Paula Water Works in Santa Paula Creek, Ventura County; the Meek Dam in San Lorenzo Creek, Alameda County; the Sunol Dam, Alameda Creek, Alameda County, and the Arroyo Del Valle Dam in Alameda County.

THE INYO HATCHERY.

Work on the Inyo Hatchery is progressing. The installation of the troughs and interior fixtures will be under way in a short time. The department of engineering expects to have the building completed at least by the first of November, and probably sooner. When this structure is completed it will be the finest hatchery building in the world, and will contain the most modern equipment. The output of this hatchery will supply all southern California, as well as the country as far north as the Yosemite Valley, with all the trout fry necessary to meet the population of the state for twenty-five years to come.

A survey of the Rae Lakes is now being made for the purpose of collecting rainbow trout eggs to supply the Inyo Hatchery. The number of fish found on the spawning beds this season assures the needed supply. An egg collecting station is being constructed and all the necessary apparatus will be stored for early operations next season. The altitude of the Rae Lakes, 10,560 feet, makes it necessary for the station to be fully equipped this season, as it is impossible to transport anything to the lakes in the spring because of the deep snow, both in the passes leading to the lakes and in the lake basin. The preparations made will allow the crew to start collecting the eggs at the first breaking of the ice at the lakes without any unnecessary delay.

Fig 75. The new Inyo Hatchery, looking east. Photograph by J. L. Von Blon.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

THE FISHERIES CONFERENCE AT SAN DIEGO.

At the San Diego meeting of the Pacific Division of the American Association for the Advancement of Science the afternoon of August 10th was set aside for a Fisheries Conference on the commercial and scientific aspects of the tuna industry.

Mr. A. J. Steele, President of the Premier Packing Company of San Diego, opened the discussion by reviewing the rise of the tuna canning industry in California. From a modest beginning about five years ago the industry has grown until now there are about one and one-half million dollars invested. About four hundred fishing boats are employed and the pack for 1915 exceeded 300,000 cases. August is the principal fishing month, but in 1915 the best fishing was in November. The runs of albacore, or long-finned tuna, are erratic and there is little knowledge

of their habits or life history. The demand for canned tuna far surpasses the supply. This year the canneries have all prepared to put up a still larger pack, but the fish have been exceedingly slow in arriving. Those who have invested in the industry are very anxious to know

Fig. 76. Kelp cutter at work off Point Loma. Photographed by H. B. Nidever, taken July 14, 1916.

more about the fish upon which they are dependent. They want to know where it goes when it leaves the California coast, and more about its movements when in our waters. They want to know how they can increase their catch and if the catch needs to be limited if they are to expect a steady annual yield. They also want to know if it is possible by conservation measures to increase the annual yield. In conclusion Mr. Steele emphasized the desirability of a thorough scientific investigation of the whole subject and expressed the hope that the meeting would result in the inauguration of a fuller investigation than has yet been attempted by the state or United States governments.

Mr. Johnson and Mr. Rankin told of the work of the United States Fisheries steamer Albatross in investigating the albacore. In the endeavor to determine the range of the albacore in Mexican waters it was impossible to locate schools of the fish early in the season. Data on the food and movements of this fish in California waters, however, has been obtained. Albacore appear in California with the coming of the small fish such as anchovies, sardines, or squid, although their food is not limited to these three varieties. Altogether fifteen species of fish have been found in their stomachs and at times the minute animal organisms known as plankton may form a large part of their food. In southern waters albacore were found feeding on several species of mollusks, crabs, devil fish and the larval forms of these. Albacore first appear between the Coronado Islands and San Clemente Island, and later move further north, but it was found impossible to follow the schools when they began to move. Some work has also been done to determine whether the cutting of the kelp by the kelp harvesters is likely to injure the fisheries. No evidence of fish eggs, fish or crawfish larvæ has been found in kelp being cut, although the leaves of the kelp on the beds to a depth of eight or ten feet were examined. Some small fish were found in the kelp but they were not the young of food fishes.

Fig. 77. Loading processed kelp at Swift Kelp Plant. After being processed, kelp is loaded in bulk into box cars and shipped to eastern plants. Photograph by H. B. Nidever, taken June 14, 1916.

While no evidence was found that cutting the kelp will injure the fish, the Bureau of Fisheries plans to continue the observations.

Dr. W. E. Ritter, director of the Scripps Institution for Biological Research, spoke at some length on the need of a scientific investigation of the tuna and kelp problems. This is a chance, he said, for scientific men to connect up their work directly with the economic development of these enterprises. With the heavy cutting of the kelp and with a demand for tuna greater than the supply, it is necessary to know whether these resources of the sea can stand the strain. Dr. Ritter was followed by C. L. Edwards, David Starr Jordan, B. W. Evermann, and G. H. Parker, each of whom agreed that a thorough scientific investigation should be made of the conditions affecting the kelp and fishing industries in order that these industries may be intelligently conserved. Dr. Ritter then proposed a resolution asking both the state and United States to institute such investigations and to appropriate enough money to carry them through. This resolution, the substance only of which is here given, was adopted by the society and a committee was appointed to bring about the investigations desired. This committee is composed of Dr. W. E. Ritter, Dr. B. W. Evermann, Dr. E. L. Michael, and Mr. N. B. Scofield.

Fig. 78. A barge load of canned tuna in cases ready for shipment from San Pedro Tuna Cannery. Photograph by H. B. Nidever, taken August 14, 1916.

A HEARING AT EUREKA.

On July 11, 1916, a public hearing was held in Eureka to give the people of Humboldt County an opportunity to discuss fish and game matters with representatives of the State Fish and Game Commission. The meeting was called by the Eureka Rod and Gun Club and the rooms of the Chamber of Commerce, where it was held, were crowded, giving ample evidence of the interest taken in fish and game by the people of Humboldt County. Senator Kehoe presided and opened the meeting by telling the people that this was their opportunity to make their wants known as to future fish and game legislation, for the recommendations of the Fish and Game Commission carry large weight with the legislature and the commission's representatives are here for the purpose of finding out what is wanted.

The Fish and Game Commission was represented by Mr. J. S. Hunter, Assistant Executive Officer, A. D. Ferguson, Field Agent, and N. B. Scofield, in charge Commercial Fisheries.

The first and most important subject taken up was that of crabs. The prin-

cipal speakers were Attorney L. F. Puter, Judge Hunter and Dr. W. E. Cook, each of whom stated that the people of Humboldt County are practically unanimous in wanting a state law which will take the place of their county ordinance, prohibiting the shipment of crabs from Humboldt County, or, in order that the law may conform to the present fish and game districts, to prohibit the shipment of crabs taken in Districts 7, 8 and 9.

Mr. Puter stated that the reason this law is desired is to prevent San Francisco crab fishermen from coming in and exterminating the crabs which the people of Humboldt County have tried so hard to protect. A fleet of these boats came up in the year 1908 and in four or five years the crabs in the bay and outside ocean waters had been nearly exterminated. The fishermen caught small and large crabs indiscriminately, and not only caught all the crabs in the bay, but operated drag nets within the bay in order to get fish for bait, with the result that even the fish were nearly exterminated. The county ordinance prohibiting the shipment of crabs from Humboldt County was passed in order to prevent the extermination of crabs and fish and has been in effective operation since December 3, 1912.

Under the protection of this ordinance crabs are again becoming fairly plentiful, but the state law allows crabs taken outside the harbor to be shipped from the county, and there is a question if the county ordinance can be enforced since it is in conflict with the state law as far as crabs outside the harbor are concerned. San Francisco crabs have become so scarce on account of overfishing that the fishermen are again trying to ply their trade in Humboldt County; if the crabs can not be protected outside the harbor these same fishermen will come in and exterminate them as they did a few years ago.

To show the rapid decline in the number of crabs caught, which it was stated was an index of their growing scarcity after the crab fishing boats began to operate in 1908, the speakers submitted the following record of the number of crabs shipped from the Port of Eureka from the year 1901 to 1912.

Crab Shipments from the Port of Eureka.

1901	3,597 dozens
1902	16,827 dozens
1903	16,433 dozens
1904	15,147 dozens
1905	10,147 dozens
1906	12,941 dozens
1907	8,814 dozens
1908	39,971 dozens
1909	23,072 dozens
1910	8,908 dozens
1911	8,456 dozens
1912	1,954 dozens

These figures seemed to prove the contention very conclusively and the representatives of the Fish and Game Commission who had believed that the crabs of that district would stand much heavier fishing than at present, were almost convinced that the number of crabs had been greatly reduced. They pointed out, however, that the fisheries, all of them, should be developed as far as is consistent with their conservation, and that, as crabs are more numerous in the north, they should, theoretically, be able to stand heavier fishing in Humboldt County than at San Francisco; and that if the records of the crabs shipped from Eureka show their rapid decline in numbers, the decrease must have been due partly to the inadequate size limit, which was then 6 inches instead of 7 inches, and to the fact that in those years crab laws were not obeyed or enforced as they are now; also, that crabs are extremely abundant at the present time, and the presence of a large proportion of very large crabs shows that they will stand much heavier fishing than at present.

The vital reason for the decline in the catch after 1908—which was overlooked by all at the meeting—was that in the fall of 1909 a state law went into effect which established a crab preserve of the area within two miles of the inside shore line of Humboldt and Trinidad bays, and of the Pacific Ocean adjacent to these bays. Crabs could be taken for commercial purposes in the preserve only on Thursday of each week. Reducing the number of commercial fishing days to one a week made it unprofitable for the San Francisco crab boats to operate even on the one open day. This amply explains the reduced catch in the years 1910 and 1911. During those two years the mini-

mum size limit was 6 inches and the fishing was done mostly inside the bay where the larger sized crabs are usually scarce. In the late summer of 1911 the size limit was raised to 7 inches, which practically put a stop to the bay fishing as the larger crabs are found in the deeper water off shore. This change in the size limit fully accounts for the still further reduction in the number exported from Eureka in 1912.

It was pointed out by those representing the Commission that the present state law amply protects crabs; that with the 7 inches minimum size limit, even if every crab over 7 inches is caught, the females are all saved and a sufficient number of breeding males, as males mature at a size less than 6 inches. It has been found that with the continued catching of male crabs at San Francisco, that the males still equal the females in number, so that with the present state laws, none of the crab fisheries can be prosecuted beyond the natural yearly increase. When all the males above 7 inches are caught the fishermen will have to wait until more grow to be 7 inches, and as the males have all bred at least once, and most of them twice by the time they are 7 inches in diameter, it is absurd to talk of exterminating the crabs by fishing with the present law in force. The yearly production of legal-sized crabs for the San Francisco crab fishery is about 50,000 dozen, which is considerably more than were taken by some 60 boats in the best year in Humboldt County when the crabs were very plentiful.

Mr. W. H. H. Heckman and others spoke on the subject of better protection for the clams and the sea mussels of their district. The commercial clam of the region is the Washington clam which is canned so extensively at different places north of California. Humboldt Bay is at the southern end of the range of this clam and the general opinion was that it is in need of some protection. A closed season of four months each year was asked for and also a daily limit of fifty clams per day. Mr. Scofield then pointed out that, on this coast at least, there is nothing in the idea that clams should be eaten only during the months that contain the letter "R"; that clams are at their best just before the spawning time and the best time for the closed season, if a closed season is necessary, would be just after the spawning time when they are thin and not so good to eat. It was also pointed out that a minimum size limit is one of the best ways to protect clams. Fix a minimum size limit at which they have spawned at least once and then the beds can not be forced to yield more than their natural annual growth. The proper time for the closed season and the proper size limit, should be left to an expert to determine.

Mr. Heckman spoke in favor of prohibiting the shipment or canning, pickling or otherwise preserving mussels that abound along the rocky shores of Humboldt County. He said that while the mussels are plentiful now, canneries are likely to start at any time and exterminate them before protective legislation can be obtained. This argument was answered by the Fish and Game representatives present, with the statement that the sea mussels abound along almost the entire California coast, that they are about the most abundant and most valuable and at the same time the least used of our sea foods. They have a food value equal to oysters, they grow very rapidly and can be "farmed" and the production in this way vastly increased. They are especially fine when pickled and when canned do not have the tendency to become tough like many of the shell fish. The United States Bureau of Fisheries has been conducting an educational campaign to induce the people on the Atlantic coast to use the mussels that are now allowed to go to waste. The California Fish and Game Commission have been preparing to start a similar campaign here in California, for our shores can supply millions of pounds where now only a few hundred pounds are used. The few that have been canned on this coast as an experiment have not met with a ready sale and it is not likely that our mussel supply will be taxed for several years to come, even if an energetic campaign is conducted to induce people to eat this highly desirable food.

The subject of salmon protection in Mad River was touched upon. It was stated that the people of Arcata are in favor of closing the river to nets for a few years at least.

The trout season was discussed at some length. The three large lagoons, Big

Lagoon, Stone Lagoon and Fresh Water Lagoon, lying to the north of Humboldt Bay, formerly furnished rare sport when the season opened on April 1st, but now by the time the season opens on May 1st, the fish have begun to get soft and of poor quality and the people do not care for them. It was suggested that to change the trout season for all of District No. 1, might not be desirable but that a separate district could be made for these lagoons or for Humboldt and Del Norte counties.

It was explained by the commission's representatives that the opening of the trout season for District No. 1 was set for May 1st because it was the belief that many of the trout in that district had not finished spawning by April 1st; that this especially applied to the cut-throat trout found in the coast streams from Mad River north, which is the most desirable of the fish caught in these same lagoons. It was stated by Mr. Lee F. Wiley and others who are well posted on the ways of this particular trout that they spawn before April and even before the steelhead; but that a few may spawn almost any month in the year.

The advisability of stocking the large lagoons of the district with new varieties of fish such as bluegill sunfish, calico bass or black bass, was then discussed. It was stated by one or two present that they would like more varieties of trout in their streams and wanted to know if the Dolly Varden would not be a good trout to introduce. They were answered that the Dolly Varden is not a suitable fish on account of its cannibalistic tendencies and because it is inferior as a game fish to the other species of trout; that the commission has never stocked streams with this variety and would like to see it exterminated in the one or two streams in the state where it is native. The German brown trout was suggested as a good variety to introduce as it has already shown itself to be adapted to streams of that part of the state. The commission expects to experiment on the propagation of this variety next year.

Altogether the meeting was a very profitable one and those present learned something from the discussions and had their views broadened. Those representing the Fish and Game Commission certainly had an opportunity to learn what the Humboldt people want. All of the requests brought up were noted with the arguments for and against so that all of the points may receive just consideration.

SAN FRANCISCO BAY OYSTERS.

Mr. McKnew of the Burlingame Oyster Company reports that oysters on the company's grounds are doing exceptionally well this year. He states that seed oysters have in the last year shown a wonderful growth, and that they are fat and in fine condition. The oysters which are brought from the Atlantic coast as seed oysters are shipped out in cold storage, taking about fifteen days for the trip. They are, at the time of planting, from ½ inch to 1 inch in length, and on their arrival are planted in beds where they are left for three to four years. They are then tonged up, boxed and shipped to the markets. Mr. McKnew states that the oysters near Burlingame Point have shown an exceptional growth: Oysters planted here in May, 1915, which ran about 8,000 to 10,000 to the bushel, in August, 1916, averaged from 1,100 to 1,200 to the bushel. The oyster planted in San Francisco bay has a great advantage over the eastern oyster, and over oysters farther north, for the milder temperature during the winter months allows more time for growth.

CHLORINATING OYSTERS

In the July bulletin of the California State Board of Health we are told that many cities chlorinate their water supply; that 22 municipalities in California, representing a population of a million people, now disinfect their water supply by this method. What is good for humans seems also to be good for the oyster wherever it is compelled to use polluted water. Experiments conducted by the sanitary chemist for the state of Maryland, have demonstrated that a practical application of this method can be made to oysters. At feeding temperatures large volumes of water, from 25 to 50 gallons, are passed through the siphon of each oyster and over its gills. The food captured by the oyster from this stream of water passing over the gills passes through its gastro-intestinal system within five hours, so that only a very short time is required for its artificial purification by the chlorinating method. There appears to be no

reason why this method can not also be applied to clams and other shellfish. This appears to be an extremely important discovery, for oysters and clams grow best in bays and estuaries that receive the fresh water of some stream or river. These are the locations that are most frequently subject to pollution. It has frequently happened that oyster and clam beds have had to be abandoned temporarily, and in some cases permanently, because of the very real danger of spreading typhoid and other water-borne diseases. If the chlorination method will work, and we are assured it will, there will be no need to condemn any oyster or clam bed. It will only be necessary to require that the oysters or clams be chlorinated. In the process the oysters are placed in water that has been treated with a trace of calcium hypochlorite, in the same proportion as is used in drinking water. Treatment requires about six hours and it is stated that the oysters show no change in condition and it is impossible to distinguish any difference in flavor between treated and untreated ones.

MARKED SALMON LIBERATED.

On February 15, 1916, 3,500 marked yearling Quinnat salmon were liberated in the Klamath River at Klamathon. They were hatched at the Simson Hatchery from eggs taken on Butte Creek in November, 1914. Each was marked by removing the left ventral and the adipose fin. It is expected that a few of these will be recovered in the Klamath River in 1917 as male grilse, and that both males and females will be taken in 1918, 1919 and 1920 as 4, 5 and 6-year-old fish.

AN AQUARIUM FOR SAN FRANCISCO.

The San Francisco Art Preservation League, which has done such good work in preserving some of the beauties of the Panama-Pacific International Exposition, has with the aid of the State Fish and Game Commission, opened the Aquarium in the Hawaiian Building. The Aquarium has been converted from a salt water to a fresh water system, and the fresh water fishes of California are being shown. A modest beginning has been made, which it is hoped will awaken an interest that will in time lead to San Francisco having an aquarium equalling the celebrated New York Aquarium. San Francisco is much more favorably situated for an aquarium than is New York, for here we have a much richer and more beautiful sea fauna from which to draw.

CLAMS IN SAN FRANCISCO BAY.

On the shore of Islais Bay, an area of tidal flat on the western shore of San Francisco Bay at the mouth of Islais Creek, clams have been dug to supply the San Francisco market since the early seventies. This tidal flat was formerly almost a mile in length from north to south and at low tide about half a mile in width. The bottom was black mud of unknown depth, composed of alluvial washings carried down by Islais Creek from the old Spanish Potrero Nuevo.

The shore line of this tidal flat was inhabited by a large number of Chinese engaged in the occupation of shrimp fishing and clam digging and it is with the clams dug by these Chinese that the writer would deal at this time.

Up to 1876 but one species of clam was found in any quantity by these diggers and that was a white-shelled variety (*Macoma nasuta*), about two and one half inches in greatest length, with a noticeable flattening of the curve of the shell from the hinge toward the apertures from which the siphons issue. The siphons were very small, being less than 1/16 of an inch in diameter and very delicate in structure.

The modus operandi of these clam diggers was as follows: Provided with a board 18 inches wide and four feet long with a strip one inch thick nailed across each end and with a Chinese basket set thereon, the digger waded out on the mud flat at low tide, pushing the basket on its sled board ahead of him. On arriving at a suitable place the clam digger pushed his hands and arms, held vertically in front of him, elbow deep into the soft mud, and then turned up the mud toward himself; straining this mud through his fingers he found the clams, which were placed in the basket. This was continued until the basket was full or the flood tide prevented further digging.

Upon arriving at camp the diggers at once placed the clams in shallow, watertight boxes about 18 inches wide, 10 inches deep, and 8 feet long; in one end

of the bottom of each box a hole was bored for draining. A layer of clams 3 or 4 inches deep was placed in each box. The box was then partially filled with clean water from the bay, the water was changed at each high tide, and after 36 or 48 hours the clams were marketed. This clean water bath was intended to allow the clams to void all mud and sand contained in the stomach and render the clams edible.

In 1876 the writer first noticed that a few clams of another species (since identified as *Mya arenaria*) were being found. This is the soft-shelled clam now on sale in the city markets. These have gradually increased in number until the native clam *Macoma* has been entirely displaced.

The soft-shelled clam was originally introduced by the oyster growers with their spat imported from the Atlantic Coast during the decade ending with 1870. It gradually spread over the tidal flats of San Francisco Bay, and is now abundant in this region.—JOHN P. FISHER.

CALICO BASS, SHARP-EARED BASS, AND BLUEGILL SUNFISH.

Calico bass, sharp-eared bass and bluegill sunfish were introduced into California waters several years ago and have now become fairly plentiful in several localities. Since these fish are of the greatest food and game value, and since they are but little known, the following information is issued so that these excellent fish may occupy the place in the public esteem which they deserve.

All of these fish belong to the family Centrarchidæ, a family of North American fresh water fishes, to which belong the sunfish, sharp-eared bass (crappies), Sacramento perch and black bass. The two species: *Pomoxis annularis* (crappie or sharp-eared bass) and *Pomoxis sparoides* (calico bass or strawberry bass) are easily distinguished from the other California members of the family by the size of the dorsal fins which are scarcely larger than the anal fin (by the size of the fin is meant the length of the base of the fin). In the other members of the family the anal fin is much smaller than the dorsal. The two may also be distinguished by the following characters.

Pomoxis annularis: Dorsal spines 6, rarely 5; tips of the ventral fins not reaching to the front of the anal fin.

Pomoxis sparoides: Dorsal spines 7, rarely 8; tips of the ventral fins reaching beyond the front of the anal fin.

These two fish are confounded by most anglers, even in the Middle West where they are best known.

Lepomis pallidus (bluegill sunfish) may be identified by the following characters: characteristic sunfish shape; dorsal fin much larger than the anal; small mouth; rather long, velvety black, opercular flap or "ear"; bluish cheek and gill cover; large, dark blotch on the last rays of the dorsal fin and a similar, but fainter one, on the anal fin.

The sharp-eared bass is better known as "crappie," but as this name is apt to prejudice many against the fish, it is suggested that deputies call it the "sharp ear" and induce the public to so call it. The sharp-ear and calico bass are both well adapted to the lower Sacramento and San Joaquin county and are likely to become quite numerous and of great importance as game and food fish.

The three species have been introduced into the waters of California as follows:

LOCALITY.

Bluegill sunfish—Honey Lake, Lassen County; Lake Vera, Nevada County; Brushy Lake, Sacramento County; Plumas Lake, Yuba County; San Joaquin River; Feather River; Clear Lake, Lake County; Kings River; Kern River; Sutterville Lake, Sacramento County; Washington Lake, Yolo County; Freeman River; Lake Cuyamaca; Elsinore Lake; Bolsa Chico River; Watsonville Lagoon.

Sharp-eared Bass (crappie)—Honey Lake, Lassen County; Lake Vera, Nevada County; Brushy Lake, Sacramento County; Plumas Lake, Yuba County; San Joaquin River; Feather River; Clear Lake, Lake County; Kings River; Kern River; Sutterville Lake, Sacramento County; Washington Lake, Yolo County; Freeman River; Lake Cuyamaca; Elsinore Lake.

Calico Bass (strawberry bass)—Lake Cuyamaca.

N. B.—It appears that calico bass were mixed with the shipments of crappie, so that wherever plants of crappie were made we can expect to find calico bass.—N. B. SCOFIELD.

CONSERVATION IN OTHER STATES.

CONSERVATION COSTS LITTLE IN NEW YORK.

Conservation has cost the people of New York state this year only $133,933.89. Actual expenditures were $702,124.66, but returns to the commission in cash or its equivalent, including the value of the output of the fish hatcheries, was $568,190.77. With a return of more than 80 per cent of the amount expended, it is evident that the practice of conservation in this state is not a financial drain on the people. Indeed, if account is taken of the value of the forests saved, of the food values of the fish and game that finally reach the tables of the people, and of the stream flow maintained through preservation of the forests, it will be found that conservation, like saving among individuals, yields a profit out of all proportion to the sacrifice involved. In addition to the above returns must be considered all of the æsthetic and recreational values of forest and stream, of hunting and fishing.—G. D. PRATT, *in American Game Protective Association Bulletin*, Vol. 5, No. 2, June 1, 1916.

LOUISIANA REMODELS CONSERVATION COMMISSION.

The governor of Louisiana has appointed M. L. Alexander Commissioner of Conservation of the new Department of Conservation created by the legislature of that state during its last session.

The Department of Conservation supersedes the former Conservation Commission of Louisiana which was composed of three commissioners. The new department of state has but one head, the commissioner. Mr. Alexander was the president of the former commission and his appointment to the head of the new conservation body is in the nature of a recognition of his efficient management of the old board.

UNITED ANGLERS' LEAGUE.

The United Anglers' League is an incorporated body with headquarters in the World Building Auditorium, New York, which for twelve years has been working in the interests of all fishermen. A monthly bulletin is issued by the league which contains many items of interest to anglers, especially to those of New York State. The May bulletin advocates federal control of the fisheries. As a make-shift New York state is attempting to give control of the marine fisheries to the state government until such time as the national government shall take over the question.

As an incentive to join the organization some of the following statements are made:

"You, no doubt, have been asking, and your sport-loving brother anglers also are wondering, why the fishing of late years is becoming poorer and poorer, and then why you have to go farther and farther away from your favorite 'old spots' to get any kind of satisfaction.

"You want to go fishing—and it is your bounden duty to your health. You must have good health, also you must be reasonably sure you are to have a good day's outing. Besides, you want to come back reinforced for your business duties.

"The congested condition of city life forces you to look to the water for recreation. More and more the waters must be used—more and more sea-food must be obtained. On the water alone you catch your appetite and its fulfillment.

"Civilization both crowds us and prompts us to get together and protect our common interests. Your friends, the United Anglers' League, have been doing this for you for the past twelve years.

"The fish trust is well organized. Organization is our only salvation. Political friends will yield to a united body. Trees, buffalo, wild pigeons have gone for lack of united action. Shall we lose our fish?"

GAME WARDENS IN WISCONSIN FURNISHED MOTORCYCLES.

The Wisconsin Conservation Commission has equipped 25 of its wardens with motorcycles. Not only will the use of these machines materially reduce transportation expenses, but it will enable the wardens to cover and patrol their districts more thoroughly.

PENNSYLVANIA TRIES THE BOUNTY SYSTEM.

Pennsylvania has been offering a bounty on wildcats, foxes, mink, and weasels. The amount expended per month has increased from about $1,000 to $12,411 paid out in January, 1916. Between April 1, 1915, and April 30,

1916, bounties were paid on 778 wild cats, 4,063 gray foxes, 4,703 red foxes, 3,975 mink, and 27,114 weasels, which represented an outlay of $54,009.

MISSISSIPPI ESTABLISHES GAME COMMISSION.

The State of Mississippi has at last decided to conserve its fish and game resources. A Department of Game and Fish has been created and a State Fish and Game Commissioner has been appointed temporarily by the Governor. The new law provides that in 1919 the State Game and Fish Commissioner shall be elected by the qualified electors of the state at large. Provision is made for the hunting license system, and closed seasons and limits are set. The limit on deer is an unusually large one. No one person is allowed to kill more than one a day, but five are allowed during a season.

LIFE HISTORY NOTES.

BAND-TAILED PIGEONS BRED IN CAPTIVITY.

In September, 1915, through the courtesy of Mr. Wm. L. Finley, State Biologist of Oregon, formerly with the Oregon Fish and Game Commission, and Mr. Ernest Schaeffle, Secretary of the California Fish and Game Commission, I received six adult specimens of the band-tailed pigeon (*Columba fasciata*). No results were obtained in breeding these birds in 1915, but this year (1916), they have nested upon three separate occasions.

On June 11th I discovered one egg which had been laid in an abandoned nest of the Nicobar pigeon, and immediately removed the egg and placed it under a pair of domestic pigeons. On June 30th this egg was hatched and the young squab throve under the care of its foster parents until it was ten days old, when, much to my regret, it jumped out of its nest in the evening and was killed.

Apparently the same pair of birds which had produced the first egg began to build a nest immediately after the egg was taken, and on June 16th they deposited another egg which was duly hatched and the young raised to maturity. The young bird is now full grown but lacks the white band on the neck and the dark band on the tail. The plumage in general seems to be somewhat darker than that of the adult bird. Before the last mentioned squab left its nest, the old bird deposited another egg in the same nest. This egg hatched on August 15th and unless the bird meets with some accident, it will soon be feathered and ready to fly.

When the birds were first received from Oregon they were exceedingly wild, but rapidly became gentle and are now quite tame. I believe that it is possible to attain considerable success in rearing these birds, if suitable quarters are provided and proper attention given to feeding and to nesting facilities.—H. R. NOACK.

BAND-TAILED PIGEONS ALLEGED DESTROYERS OF GRAIN.

During the spring of 1916 there were thousands of band-tailed pigeons here; in fact, I have not seen so many in the last ten years. There was some complaint that they fed upon newly sown grain. I made some investigation and am inclined to think they only eat what grain is left upon the ground. I do not think they pull up or scratch what is covered.

On May 6th, in response to a complaint from Mr. Laurenson that pigeons were eating up all of his grain as fast as he sowed it, I made a trip to Mad River. I found thousands of pigeons but could not see that they were doing any particular damage, as they were only picking up the grain that was not covered.—EARL P. BARNES.

THE SOOTY GROUSE IN TRINITY COUNTY.

Sooty grouse (*Dendragapus obscurus fuliginosus*) are found in the high timbered regions throughout the Trinity National Forest, but are comparatively scarce through the eastern portion, being more plentiful west of the south fork of Trinity River, particularly on the west slope of the South Fork Mountain, on Grouse Mountain and Grizzly Mountain.

The dates of mating and nesting in in the spring being influenced by the advent of warm days, appear to vary con-

siderably with the season. Mating begins in the latter part of February or first of March: at this season the male struts out unlike a turkey gobbler, and produces a sound with his throat called booming, which can be heard for long distances. This booming may be heard as late as May or June. The time of nesting is variously reported from different districts of the forest: the earliest date for the beginning of nesting being in March, and the latest date in June, some broods hatching as late as the middle of July, due perhaps, to the fact that many of the nests are destroyed, and a second nesting takes place. The nests are made on the ground, in tall grass or in clumps of brush or young trees. The broods vary in number from eight to eighteen.

During the winter months sooty grouse are seldom seen on the ground. At this season they live in the fir trees on the high mountains, and feed on fir buds. During February they begin to move down to the more open areas at lower elevations, where they find grass and clover coming up, and where conditions are suitable for nesting. During the spring and early summer months their food consists of tender grasses and grass seeds, buds and insects, including grasshoppers; they are also very fond of grain. In the late summer and early fall grouse are found largely around springs and moist places. Their food at this season consists of seeds, berries and insects. With the return of cold weather they return to the fir forests on the high mountains and ridges.—J. D. Coffman.

COYOTE KILLED WHILE IN PURSUIT OF A DEER.

While hunting deer near Landslide Meadow on the morning of August 20th, Messrs. Eugene Brigger and Frank Harrel heard the bleating of a young deer which soon came into sight around some brush, with a coyote in pursuit, almost ready to seize it. Mr. Brigger made a lucky shot with his rifle, brought down the coyote, and without doubt saved the deer's life. The coyote was an old female which showed evidence of having a litter of pups dependent upon her.—Wm. M. Clingan.

MOUNTAIN SHEEP SEEN IN OAK CREEK PASS.

On July 11, 1916, while on a trip to Rae Lakes, when about five miles by trail from the new Inyo Hatchery and about one and a half miles from Oak Creek Pass, Mr. Frank Shebley, Mr. Carl Walters, and myself, saw 22 mountain sheep (*Ovis canadensis sierræ*). One ewe, which had two kids about a month old, was seen to jump out of low brush not more than 25 yards from us.—E. H. Offer.

UNITED STATES FOREST SERVICE CO-OPERATION.

L. H. Whiteman, Editor.

PREDATORY ANIMALS BEING KILLED ON CALIFORNIA NATIONAL FOREST.

The United States Biological Survey has two men employed hunting and trapping predatory animals on the California National Forest. They have had fair luck considering the time of year, having killed ten coyotes, one mountain lion and a number of smaller varmints.

SWAT THE COYOTE.

Much has been written about the depredations of the mountain lion on deer, and it is probable that each mature mountain lion in California kills from one to three deer weekly. The lion, however, does not thrive in civilization, and is becoming scarce except in remote places. A much greater menace to deer as well as to all other game is the furtive coyote. The lion springs upon the biggest buck in the woods; carries him, kicking and struggling, as far as his panthership was fit, and plays with him as a cat with a mouse; then kills him, often by holding him flat on his side while eating into his vitals. Finally it hides the remains very carefully by scratching up all of the litter in a radius of ten feet, and making a neat mound which seldom fails to attract the attention of the passerby. Thus the story of the killing gets to the papers and is scattered to the four winds.

On the other hand, there is nothing of the spectacular about the coyote. His work is done in an insidious manner,

without publicity or unnecessary grandstand plays. He readily adapts himself to changed conditions and, where constant warfare is not waged against him, will live and increase in thickly settled country. All mountainous parts of California are more or less infested with this pest, and while their most noticeable depredations are against sheep, hogs, and poultry, they take a constant and heavy toll from every kind of wild life, from cottontails and quail to deer. No bird's nest within six feet of the ground is safe if one of these prowlers is about, and there are many instances of organized bands of from two to six coyotes running down and killing large, antlered bucks.

In winters of heavy snowfall like the one just past, deer in large numbers become easy victims of coyotes. The deer are generally able to move about enough to secure food, but are helpless if attacked by coyotes, since they break through the crust when they attempt to escape, and soon become exhausted.

Giving venison a cash value of twenty cents per pound, it is a conservative estimate that $100,000 worth of venison is destroyed annually by coyotes. This, if coupled with the more tangible loss of sheep, hogs, and poultry, would make an alarming total.

This economic waste has been borne more or less passively by the people of the state in the past, but the recent outbreak of rabies among coyotes, which constitutes a serious menace to all branches of the stock industry as well as to human life, puts a new face on the matter. The coyote must be exterminated, and an organized, statewide campaign should be started at once which should include the state and federal officers of public health, all branches of the live stock industry, poultry raisers, and the State Fish and Game Commission.—B. H. Mace.

QUAIL SEASON.

Attention has been called in previous reports to the desirability of having the season on mountain and valley quail the same. Observations made during a recent trip on the Sierra Forest prove that the same conditions exist in the Sierras. Where the two species of quail occupy the same region it is impossible to prevent unintentional violations of the law when the season on one is open and on the other is closed. A season properly applicable to both is much to be preferred to a law conducive to unintentional violations.—J. D. Coffman.

WILD PIGEONS ACCUSED OF CARRYING HOG CHOLERA.

It is believed by some of the stockmen in the vicinity of Tule River, Sequoia National Forest, that wild pigeons carried hog cholera from the valley and infected the region. The pigeons were known to have been feeding on acorns in the valley in cholera-infected areas, and when they migrated to the Tule River country, where there was a heavy acorn crop, cholera immediately broke out there.—Frank P. Cunningham.

IMPROVED CONDITIONS IN CALIFORNIA NATIONAL FOREST.

In spite of the fact that there have been from two to three times the number of hunters in the California National Forest during the present open season than ever before, there has not been one accident and no dead does have been found in the forest. This is due largely to the "no spike" law. In the good old days when the inadequate game laws then in existence were a dead letter in the mountains, it was a common practice for hunters to blaze away at every movement or noise in the brush, and fatal accidents were of frequent occurrence. Later, as the game wardens became more numerous and active, doe killing became so unpopular that a hunter who brought one to camp was "kidded" unmercifully by his companions, so that the majority of hunters gave up the practice.

There were still many, however, who, in their desire to get meat, would persuade themselves that they saw "spikes" on anything that moved in the woods, and, finding that they had killed a doe, would leave it in the woods rather than face the ridicule of the camp. Under the present law, requiring that any deer killed must be at least a forked-horn, there is no excuse for the hunter who kills a doe or human being.

Steelhead fishing has been unusually good in the north fork of middle fork of Eel River, in the California National

Forest. This is one of the few streams of the state where steelhead trout up to ten pounds in weight remain all summer.

TWO BIRDS WITH ONE STONE.

Not a ground squirrel or a rattlesnake was found on the California Forest recently while the rangers were running a fire line through a region heretofore replete with these animals. The absence of squirrels was rightly attributed to the work during recent years by the poison squads of the United States Biological Survey. The scarcity of rattlers is a mystery, unless it be that the poisoned squirrels are instrumental in poisoning the snakes.

TROUT TO BE RESCUED FROM STREAMS.

At the suggestion of Forest Ranger Bert Stephenson of the Cleveland National Forest, a fund is being raised in order that trout imprisoned in the rapidly drying pools of some of the mountain streams may be rescued. According to Ranger Stephenson, between 4,000 and 5,000 trout can be saved if proper steps are taken. Although there are many places in Orange County trout streams where trout have been caught in pools, yet most of the fish in danger are located in the San Juan Hot Springs and the Trabuco Canyons.

WILD LIFE IN RELATION TO AGRICULTURE.

BLACKBIRDS DAMAGE CROPS IN IMPERIAL VALLEY.

Mr. Paul Dougherty, the Farm Advisor of Imperial County informs us that blackbirds, including the bicolored, yellow-headed and Brewer varieties, seriously injure Egyptian corn in the Imperial Valley. When the corn is ripening in the fall large numbers of migratory blackbirds arrive from the Great Basin and, joining force with the few resident birds, attack the corn-fields. Owing to the fact that little of the southeastern desert affords proper food for these immigrants, there is a concentration of the birds in areas where cultivated crops are grown. Hence the problem is a serious one. The resident bicolored blackbirds are not abundant enough to seriously endanger crops, but the host of migratory birds which appear in the fall renders the growing of Egyptian corn almost hopeless. Means of controlling these birds which actually do become a pest under these circumstances are difficult to find. The only method which can be recommended is that of shooting, a method which is expensive and not always entirely successful.

Fortunately the game laws of our state provide that the owner or tenant of premises may kill such non-game birds as may be destroying crops, thus making it possible to meet such a problem as this, where a bird showing no strongly positive value to agriculture becomes a menace to growing crops.

RABBITS DAMAGE CROPS IN SAN DIEGO COUNTY.

Constant complaint has been received regarding the depredations of rabbits in San Diego County. On the request of Mr. Weinland, the farm advisor of that county, I investigated conditions on August 11 and 12, 1916.

At El Cajon, on the ranch of Mr. C. B. Purnall, I was shown small orchard trees such as peaches and almonds, which had been severely damaged by rabbits, in spite of the fact that a rabbit fence partially enclosed the small orchard. In many instances trees had been killed, and many other trees were forced to sprout out below the graft because rabbits had continually cut off the growing shoots and had barked the trees lower down. A small camphor tree which had been killed was taken as evidence. More small fig trees were only saved from damage by protecting them with tin cans. Tomatoes planted last year were entirely destroyed by rabbits; hubbard squashes met the same fate. Mr. Purnall reported that both cottontail and jack rabbits were responsible for the damage, but that cottontails were most numerous. Evidence in the form of tracks proved Mr. Purnall's contention to be correct.

Mr. F. McKenney reported the loss of five acres of sudan grass. Mr. H. H. Kessler showed me extensive damage to beans, corn, and sudan grass. Beans near the edge of the field had been eaten to the ground, as had also the grain and

sudan grass. Mr. F. Springstead of El Cajon reported great damage to peppers, stating that at least one-third of his planting of last year had been destroyed by rabbits.

At Ramona J. F. Howarth lost the whole of his barley crop last year, due to the ravages of rabbits. He showed me damage to melons, milo maize, and large areas of uncultivated land adjacent to ranches make ideal breeding grounds for these animals. Rabbits from large tracts of brush land concentrate on the relatively narrow strips of cultivated land and as a consequence the damage is considerable. Damage appears to be at a maximum in the early spring when the first green shoots appear.

Fig. 79. A corner of a field of milo maize on the ranch of J. Howarth, Ramona, San Diego County, showing damage by rabbits. The hills in the background form an excellent breeding place for rabbits, and these animals seriously damage growing crops.

sudan grass (see figs. 79 and 80). Apparently jack rabbits were doing most damage in this locality. Mr. William Dukes, a near neighbor, reported damage to alfalfa. Like complaints were received from many other ranchers.

Dr. J. Grinnell, who investigated conditions in the vicinity of San Onofre, reports that he found an area of about fifteen to twenty-five yards along the sides of lima bean fields near brush entirely cleaned by rabbits. Rabbit and wood rat tracks were to be found all over the bean fields, and search disclosed many bitten and empty bean pods and cut-off stems.

The investigation showed that conditions in San Diego County are altogether different from those in other parts of the state. Both cottontail, brush and jack rabbits are very abundant, and the

Although a few of the men interviewed seem to desire the rabbits be given no protection, yet it would appear that the present law is more effective than a law taking protection from these animals. The present law concentrates hunting on the ranches where permission can be obtained to hunt in case rabbits are damaging crops. A law giving no protection to rabbits would distribute hunting, and most gunners would hunt away from ranches rather than on them.

There is no doubt but that ranchers in certain localities in San Diego County need some means of protecting their crops. In my mind the best solution of the problem would be to allow ranchers who are being troubled to use poison. The poison used for rabbits is not dangerous to other game mammals or to birds, nor would the use of poison endanger the

breeding stock of rabbits in San Diego County.

According to the United States Department of Agriculture:

"In localities where cottontails are sufficiently abundant to be a continual menace, the safest and most nearly permanent method of securing immunity from their ravages is to fence against them. It has been found that woven wire netting of 14-inch mesh and 30 inches high will exclude rabbits, provided

"The poisoned oats, prunings, or green baits are dropped along rabbit trails or in places frequented by the rabbits, care being exercised in placing them to prevent any possible injury to live stock.

"The following poisoned wash has proved highly satisfactory in the West and promises to be one of the most popular methods of protecting trees from rabbits:

"*Poisoned tree wash.* Dissolve one ounce of strychnine sulphate in three

FIG. 80. A close view of milo maize stalks gnawed by rabbits. Photograph taken on ranch of J. Howarth, Ramona, San Diego County, Cal., August 12, 1916.

that the lower border of the fence is buried 5 or 6 inches below the surface of the ground. In cases where a small number of trees are concerned, a cylinder of similar wire netting around each tree, if so fastened that it can not be pushed up close against the tree, serves the purpose more economically.

"*Poisoned green baits.* Cut up a supply of carrots, parsnips, apples, or other similar baits into cubes one-half to one inch in diameter. Insert in each a small quantity of powdered strychnine or a small strychnine crystal. When a larger quantity is to be prepared, the powdered strychnine can be dusted over the bait by means of a salt shaker, in the proportion of one-eighth ounce of strychnine to two quarts of the baits.

quarts of boiling water and add one-half pint of laundry starch, previously dissolved in one pint of cold water. Boil this mixture until it becomes a clear paste. Add one ounce of glycerin and stir thoroughly. When sufficiently cool apply to the trunks of trees with a paint brush. Rabbits that gnaw the bark will be killed before the tree is injured.

"Many other repellent tree washes have been used with varying success." The application of blood from a killed animal or of a spray made of blood meal is a well known repellent.

The above means can all be recommended to the rancher but the cost of fencing is often prohibitive and the tree wash is only temporarily effective. Hence the more economical and permanently ef-

festive method, that of poison, would appear to best afford relief to the ranchers of San Diego County.—H. C. BRYANT.

GULLS DESTROY MICE.

Gulls, when visiting the rivers and marshes of the interior valleys of California, do not appear to be wholly scavengers or piscivorous. A California gull (*Larus californicus*) taken on March 12, 1912, along the San Joaquin River near Mendota, Fresno County, was presented to me. Upon dissection I was astonished to find its stomach filled with common black crickets and three whole field mice. —H. C. OHL.

SPREAD OF THE STARLING IN NEW ENGLAND.

According to information received by Mr. E. H. Forbush, State Ornithologist of Massachusetts, the starling has now spread to every county in Massachusetts and to every state in New England. Already much complaint has been made of its depredations in orchards.—*Current Items of Interest*, April 11, 1916.

REPORTS.

VIOLATIONS OF THE FISH AND GAME LAWS.

June 1, 1916 to August 31, 1916.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without license	32	$450 00
Deer, close season, killing or possession	29	640 00
Female deer, spiked bucks, killing or possession	15	600 00
Failure to retain deer horns	1	----------
Nongame birds, killing or possession	1	10 00
Cottontail rabbits, close season, killing or possession	10	135 00
Ducks, close season, killing or possession	5	500 00
Quail, close season, killing or possession	5	125 00
Doves, close season, killing or possession	4	100 00
Wild pigeons, close season, killing or possession	3	50 00
Grouse, close season, killing or possession	4	50 00
Collecting bird eggs without proper permit	1	15 00
Antelope, possession	1	----------
Issuing receipt instead of license	1	----------
Total game violations	112	$2,675 00
Fish.		
Angling without license	43	$775 00
Refusing to show angling license to deputy on demand	1	50 00
Fishing for profit without license	36	300 00
Failure to make report of fish received	2	10 00
Trout, close season, taking or possession	3	75 00
Trout, excess bag limit	7	75 00
Illegal fishing apparatus	15	850 00
Undersized crabs, taking or possession	1	85 00
Abalones, undersized, excess bag limit	6	120 00
Dynamiting fish	3	200 00
Pollution	1	----------
Clams, undersized, excess bag limit	9	50 00
Dried California shrimp in possession	2	----------
Black bass, undersized, possession	3	60 00
Lobsters, in possession, close season	1	20 00
Undersized catfish, sale	1	20 00
Striped bass, underweight	1	----------
Total fish violations	141	$2,670 00
Grand total fish and game violations	253	$5,345 00

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

June 1, 1916 to August 31, 1916.

Game.		
Deer meat	522	pounds
Deer hides	3	
Rabbits	28	
Ducks	22	
Doves	5	
Quail	3	
Miscellaneous game	10	
Fish.		
Striped bass	1,000	pounds
Trout	60	pounds
Salmon	120	pounds
Dried shrimp	275	pounds
Crabs	60	
Clams	540	
Abalones	82	
Lobsters	4	
Miscellaneous fish	100	pounds
Illegal nets and lines	6	
Searches.		
Illegal fish and game	85	

FINANCIAL REPORT.

Statement of Expenditures for the Months of May and June, 1916.

	May	June
General administration, salaries, traveling expenses, rentals, supplies, etc.	$2,218 22	$2,219 97
San Francisco district, salaries, traveling expenses, rentals, supplies, etc.	5,812 18	5,667 58
Sacramento district, salaries, traveling expenses, rentals, supplies, etc.	3,975 88	4,388 43
Los Angeles district, salaries, traveling expenses, rentals, supplies, etc.	3,002 48	2,116 92
Hatchery administration, salaries, traveling expenses, rentals, supplies, etc.	813 18	876 55
Fishery research and publicity, salaries, traveling expenses, supplies, etc.	405 08	589 71
Screen and fishway surveys, etc., salaries, traveling expenses, supplies, etc.	450 98	510 46
Fish transplanting, salaries, traveling expenses, supplies, etc.	19 50	30 21
Fish distribution cars (1 and 2) salaries, traveling expenses, rentals, supplies, etc.	136 05	1,197 45
Fish patrol launches, salaries, traveling expenses, supplies, etc.	1,072 89	1,042 21
Sisson Hatchery, salaries, traveling expenses, supplies, etc.	2,580 85	2,577 95
Sisson Hatchery, auxiliary stations, salaries, traveling expenses, supplies, etc.	44 10	2 00
Tahoe Hatcheries, salaries, traveling expenses, supplies, etc.	437 78	505 15
Price Creek Hatchery, salaries, traveling expenses, supplies, etc.		
Ukiah and Snow Mountain hatcheries, salaries, traveling expenses, supplies, etc.	634 67	389 08
Scott Creek and Brookdale hatcheries, salaries, traveling expenses, supplies, etc.	298 79	408 89
Bear Valley Hatchery, salaries, traveling expenses, supplies, etc.	348 33	373 99
Marlett Lake and Carson hatcheries, salaries, traveling expenses, supplies, etc.	25 80	33 05
Fort Seward Hatchery, salaries, traveling expenses, supplies, etc.	879 44	961 94
Inyo County Hatchery, salaries, traveling expenses, supplies, etc.	4,759 06	287 28
Almanor Station, salaries, traveling expenses, supplies, etc.	296 33	247 49
Game farm, salaries, traveling expenses, rentals, traveling expenses, supplies, etc.	232 44	356 72
Game research and publicity, salaries, traveling expenses, supplies, etc.	197 20	190 67
Prosecutions and allowances	261 50	147 50
Hunting license commissions and refunds	570 00	1,551 00
Anglers' license commissions and refunds	957 60	1,735 70
Market fishing license commissions and refunds	178 50	122 50
Crawfish and abalone inspection	100 00	100 00
Winter game feeding		
Mountain lion bounties	160 00	200 00
Printing and lithographing	1,227 09	164 50
Claims paid account accidents		
Totals	$32,096 12	$28,440 30
Balances:		
Fish and Game Preservation Fund	$63,507 27	$55,106 80
Support and Maintenance Hatcheries Fund	19,457 15	20,015 50
	$83,094 43	$75,122 30
Less monthly claims	32,096 12	28,440 30
Balance available after monthly claims are paid	$51,018 30	$46,680 00

INDEX TO VOLUME TWO

INDEX TO VOLUME 2.

A

Abalone, 101, 102–3, 153, 155, 167, 175, 178, 187; pearl formation, 182–185.
  Red, 176.
Accidents, see hunting accidents.
Adams, C. C., 28; science and progress in the protection of forest, fish and game animals, 19–22.
Administrative changes, 85.
Albacore, 102–3, 166, 203, 204.
Alexander, M. L., 211.
American Association for the Advancement of Science, 203.
AMERICAN GAME PROTECTIVE ASSOCIATION BULLETIN, 149, 211.
American Game Protective and Propagation Society, 8, 149, 196.
American Museum of Natural History, 29, 146.
Anchovy, 99, 102–3, 154, 166, 204.
Angler, 15, 18, 20, 42, 44, 96, 131, 132, 133, 165.
Angling, 14.
Antelope, 30, 31, 125, 145, 160; increase in Siskiyou County, 162.
Antilocapra americana americana, 162.
Antlers, 118, 120, 121, 122, 164; malformed, 48; malformed of deer, 119–123.
Aquarium, 33; for San Francisco, 209.
Armstrong, W. H., 93, 190.
Auk, Great, 192.

B

Badger, 35.
Bag limit, 30, 85, 124, 131, 159, 186, 197.
Bait, 26, 27, 206, 217.
BAKERSFIELD CALIFORNIAN, 89.
Barnacle, 151.
  Goose-neck, 150.
Barnes, E. P., band-tailed pigeons alleged destroyers of grain, 212.
Barracuda, 102, 130, 133, 166.
Bass, 62, 132, 133, 210; calico bass, sharp-eared bass, and blue-gilled sunfish, 210.
  Black, 21, 50, 99, 145, 180, 208; at San Diego, 156.
  Black Sea, 102–3, 166.
  Calico, 208, 210.
  Rock, 102–3, 166.
  Sharp-eared, 210.
  Strawberry, 210.
  Striped, 63, 96, 102, 104, 133, 166, 200.
  White Sea, 102–3, 166.
Bear, 66, 67, 111, 137, 190, 194; protection for, in Pennsylvania, 159.
  Black, 32, 34, 35, 66, 68, 69, 186.
  Brown, 66.
  Cave, 82.
  Cinnamon, 68; killed in Modoc County, 111.
  Grizzly, 65, 66, 68, 69, 125, 186; does it exist in California?, 65-69.
Beaver, 87, 90; on the increase in Modoc County, 163.
  Golden, to be driven from homes, 90–91.
Becker, H. D., 85.
Beck, J. A., for selfish reasons, 198.
Beetle, 49.
Big Game, 8, 9.
Bird, 31, 86, 89, 95, 111, 141, 144, 145, 146, 147, 158, 190, 195, 199, 212; attracting, 148; insectivorous, 109, 157, 192; migratory, 45, 191; children taught to recognize, 91; effect of war on, 93; Italy stops slaughter, 109; protection, 38; lovers, 148; a new danger to in England, 197; two, with one stone, 215.
  Shore, 33, 45, 191.
Birds, a distributional list of California, 36–38.
Bison, American, 192; herd increases, 45.
  European, 158–159.
Blackbird, 49, 93; damage crops in Imperial Valley, 215.
  Bicolored, 215.
  Brewer, 215.
  Yellow-headed, 215.
Blackcock, 6.
Black Duck, 90.
Bluefish, 102–103, 166.
Bluejay, Mountain, 33.
Boccaccio, 102–103, 166.
Bolton, A. L., 71.
Bonita, 102–103, 153, 166.
Bounty, 112, 158, 211; see lion bounties; Pennsylvania tries system, 211.
Bowsher, E. C., 39; the ring-necked pheasant in Utah, 157.
Boutan, Dr., 184, 185.
Boy Scouts, 109; co-operation, 144.
Branta canadensis canadensis, 47.
Brenner, C. O., deer scarce in Cleveland National Forest, 112.

Brown, W. S., two cinnamon bears killed in Modoc County, 111; rabid coyotes in Modoc County, 111–112; trout in Goose Lake, 112; beaver on the increase in Modoc County, 163.
Bryant, H. C., 83, 88, 118, 136, 142, 144, 189; Canada geese bred in capitivity, 47; California's prehistoric game, 82; ducks from the Great Salt Lake taken in California, 110; the Columbian sharp-tailed grouse in northeastern California, 161; pheasants increase on Yerba Buena Island in San Francisco Bay, 163; rabbits damage crops in San Diego County, 215–218.
Buck, 75, 112, 119, 120, 121, 122, 123, 124, 138, 164, 213, 214; Spiked, 136, 214.
Buffalo, 45, 214.
Bullfinch, 152.
Bull Frogs, introduced into Oregon, 44.
Bureau of Education, Publicity and Research, 38, 137, 144, 196.
Burning, an Indian's view of, 194–196.
Bustard, 4.
Buzzard, Turkey, protection removed from, 45.

C

California Academy of Sciences, 32, 71, 74, 75, 126, 151, 164.
CALIFORNIA FISH AND GAME, 47, 50, 70, 75, 83, 100, 110, 136, 137, 152, 189.
Cancer magister, 22, 24, 25, 27.
gracilis, 24.
productus, 26.
Canis latrans lestes, 125, 126.
ochropus ochropus, 126.
ochropus estor, 126.
Cannery, 153, 154, 207.
Carnivores, 82.
Carp, 102–103, 145, 166.
Casey, J., 196.
Castor subauratus, 90.
Castration, 123.
Cat, House, 21, 109.
Domestic, 148.
Catfish, 102–103, 145, 166.
Caviar, from salmon and shad eggs, 40–41.
Centrarchidæ, 210.
Centrocercus urophasianus, 163.
Cervus nannodes, 70.
Chamberlain-Hayden Game Sanctuary Bill, 189; the, 193–194.
Charlton, R. H., the Angeles Forest Game Refuge, 164.
Chilipepper, 102–103, 166.
Chironomid Fly, 180, 181, 182.
Citellus beecheyi, 11, 13.
Clam, 40, 102–103, 129, 151, 155, 157, 167, 207; California, 175–178; in San Francisco Bay, 209–210.
Bent-nosed, 178.
Butter, 178.
Cockle, 102–103, 167.
Mud, 40, 151, 177.
Pismo, 101, 102–103, 167, 175, 176, 177.
Sand, 178.
Soft shell, 40, 101, 102–103, 151, 167, 177, 210.
White, 178.
White-shelled, 209.
Clarke, F. C., 120, 121, 122, 137; malformed antlers of deer, 119–123.
Clarke, W. T., do hooked fish die after being returned to the stream?, 42.
Clegg, M. T. [with C. C. Pierce], the effect of strychnine sulphate on California valley quail, 11–13.
Clingan, W. M., coyote killed while in pursuit of deer, 213.
Close Season, 44, 131, 157, 164, 207.
Clupia sapidissima, 58.
Coalfish, 102–103, 166.
Cod, Cultus, 102–103, 166.
Rock, 153.
Tom, 102–103, 167.
Codfish, 81, 176.
Coffman, J. D., all venison should be utilized, 164; deer and the deer law in Trinity County, 164; Trinity Game Refuge, 165; the sooty grouse in Trinity County, 212–213; quail season, 214.
Columba fasciata, 212.
Commercial fisheries, department of, 70.
CONDOR, THE, 38.
Connell, M. J., 85, 98, 134.
Conservation, 91, 135, 137, 144, 145, 185, 189, 192, 193; a good salmon measure, 156; a new society, 157; of game, 38, 82, 158; in New Mexico, 160; costs little in New York, 211.
Commission, Louisiana remodels, 211; Wisconsin, 211.
Conservationists, 79.
Cooke, W. W., 35.
Cooper, J. G., 37.
Cooper Ornithological Club, 38.

Coot, 45.
Corbina, 133.
Cormorant, protection removed from, 45; do cormorants eat fish?, 198.
Double-crested, 198.
Cooperation, need of, in fish and game preservation, 77–79.
Cottontail, 186, 215.
Courtright, G. W., 145; antelope increase in Siskiyou County, 162; courting of sage hen, 163.
Coyote, 35, 66, 67, 126, 127, 128, 161, 213; rabid in Modoc County, 111–112; killed while in pursuit of deer, 213; sweat the, 213–214.
Desert, 126.
Mountain, 125, 126.
Valley, 126.
Crab, 38, 102–103, 167, 187, 204, 206, 207; fishery, 22, 24; trap, 27; summer migration of, 39.
Blue, 27.
Edible, 22, 27, 39.
Soft, 22.
Crane, Whooping, 192.
Crappie, 210.
Crawfish, 155, 204.
Croaker, 132.
Crustacean, 27, 40, 63, 99, 101, 102–103, 150, 167.
Cunningham, F. P., wild pigeons accused of carrying hog cholera, 214.
Curlew, Eskimo, 35, 192.
Long-billed, 192.
CURRENT ITEMS OF INTEREST, 197.
Cuthbert, 101, 102–103, 167.
Cyprinoidea, 180.
Cyprinodon macularius, 179.

D

Danaher, J. M., 71, 72.
Dawson, W. L., 91.
Deer, 3, 4, 5, 6, 7, 8, 10, 20, 28, 30, 31, 32, 36, 44, 45, 85, 86, 93, 119, 121, 122, 123, 125, 131, 159, 163, 165, 185, 186, 189, 190, 194, 195, 211, 213, 214; commission feeds, 83–84; feeding houses for, 95; snares in Cleveland National Forest, 112; hides, 124; salt licks for, 140–141; die from peculiar disease, 138–139; hunters attention, 136; at least 12,000 killed in 1915, 139; need closed season, 164; and the deer law in Trinity County, 164.
Black-tailed, 110, 118, 136.
Coast Mule, 121.
Dendragapus obscurus fuliginosus, 212.
Deputy, 29; educational function of, 137.
Devil Fish, 204.
DeWitt, J. X., 87.
Didelphis virginiana, 46.
Dirks, W. N., 29; green-winged teal nesting in Alameda County, 46.
Disease, 149; of quail, 95; of squirrels, 112; of deer, 138; of cats, 148.
Dixon, J., does the grizzly bear still exist in California?, 65-69; the timber wolf in California, 125–129.
Doe, 75, 112, 123, 124, 138, 141, 214; New York prevents killing of, 159.
Dog, 66, 67, 126, 128, 131, 158, 163, 186, 197.
Dogfish, 102–103, 166.
Doney, A. E., early game conditions in Siskiyou County, 123–124.
Dougherty, P., 215.
Dove, 33, 131.
Western Mourning, bred in captivity, 163.
Dowitcher, 111, 193.
Downing, E., the opossum in Alameda County, 110; Wilson snipe unusually abundant in Alameda County, 110–111.
Duck, 5, 36, 92, 110, 143, 145, 147, 150, 159, 186, 190; vs. rice, 49–50; breeding for sport, 90; 1915–1916 season poorest in years, 93; from Great Salt Lake taken in California, 110.
Black, 90.
Fulvous Tree–, 30, 199.
Labrador, 192.
Mallard, 49, 90, 147, 161, 199.
Mandarin, 30.
Pintail, 110, 199.
Spoonbill, 199.
Teal, Cinnamon, 46, 199.
Green-winged, 46, 110, 199.
Wood, 30, 193.
Duckling, 46.
Duke, R. D., 196.

E

Eel-grass, 101, 102–103, 167.
Edible Crab, contributions to the life history of, 22–27.

EDITORIALS.
Do we want Scotland's game laws?, 28–29; fish and game deputies given instructions, 29; Dr. Charles Frederick Holder, 29–30; are we coming to this?, 30; game farm exhibit at exposition, 30; deer receive added protection in Contra Costa County, 30–31; predaceous birds and mammals, 31; leading fish and game commissions of the United States, 31–32; ring-necked pheasants reared at game farm planted in different parts of state, 32; California Fish and Game Commission exhibit in Panama-Pacific International Exposition, 32–33; squirrel poisoning and valley quail, 33–34; wild duck foods, 34; our annual catch of fur-bearing mammals, 34–35; shore birds and their future, 35; game refuges, 35–36; California and spiked bucks, 36; violators of the game laws, 36; a distributional list of the birds of California, 36–38; lectures on wild life, 38; forest service co-operation, 83; commission feeds deer and quail, 83–84; parcel post shipments of game, 84; Oregon protects fur-bearing mammals, 84–85; administrative changes, 85; notes from the Los Angeles district, 85; cold weather and game, 85–86; valuable information on fish and game, 87; John X. De Witt, 87; a hearing at Santa Rosa, 87–88; game laws *vs.* knowledge, 89; song-birds are killed, 89; attempt to abolish Klamath Lake bird reservation, 89; breeding ducks for sport, 90; golden beavers to be driven from homes, 90–91; children taught to recognize birds, 91; who is responsible?, 91; cemeteries as bird sanctuaries, 91; game wardens and automobiles, 92; domesticating minks, 92; 1915–1916 duck season poorest in years, 93; the effect of the war on birds, 93; hunting accidents, 93–94; reappearance of quail disease, 95; a mixed ration for pheasants, 95; 1917 national sportsmen's show, 95–96; feeding houses for deer and quail, 96; look before you shoot, 136; deer hunters attention, 136; the educational function of the deputy, 137; venison can be distinguished from other meats, 137–138; advantages of a buck law, 138; deer die from peculiar disease, 138–139; at least 12,000 deer killed in 1915, 139–140; salt licks for deer, 140–141; war to be waged on English sparrow, 141; judges give severe sentences, 141; Snow Mountain dam hearing, 141–142; wild game and its preservation, 143; is it any wonder?, 144; boy scout co-operation, 144; fish and game lectures given to forestry students, 144–145; fish and game exhibit at Chico fair, 145; why antelope do not increase, 145; sea lions tried as carp-killers, 145–146; the scientific collector, 146; suggestions for ornithological work, 146–148; attracting birds, 148; the domestic cat, 148; the breeding and shooting of the American pheasant, 149; a great work on pheasants, 149; to the sportsmen of California, 149–150; our second birthday, 189; a new department, 189; a chain of game refuges for California, 189; fishing popular, 190; game resources of California advertised by forest service, 190; ranchers protect game, 191; the campaign against the English sparrow, 191; regulations for the protection of migratory birds, 191–192; statement of the federal advisory committee of the migratory bird law, 192–193; the Chamberlain-Hayden game sanctuary bill, 193–194; an Indian's view of burning and a reply, 194–196; British Columbia has established the Hungarian partridge, 196; obtain an authoritative work on pheasant breeding free, 196; four classes of violators, 196–197; club urges protection of harmless snakes, 197; a warden's duties in Pennsylvania, 197; a new danger to birds in England, 197; some suggested changes in fish and game laws, 197–198; for selfish reasons, 198; do cormorants eat fish?, 198–199; game birds for sale, 199.

Eel, 39.

Eggs, of green-winged teal, 46; of duck, coyote eats, 161; of fish, 97, 101, 150, 152, 156, 204; of mallard, 161; of rainbow trout, 201; of salmon, 41, 200; of shad, 200; of striped bass, 200; of valley quail, 47; of band-tailed pigeon, 212.

Egret, American, 193.
Snowy, 193.
Elephant, 82.
Elk, 35, 44, 45, 123, 124, 164, 194; California valley, 70–77; in Shasta County, 111.
Valley, 70, 71, 77.
Elks, Order of, 193.
Ellis, S. L. N., 43.
Evans, S. C., 72.
Evermann, B. W., 205; the California valley elk, 70–77.

F

Fauna, 209.
Fawn, 32, 77, 112, 123, 124, 138; born in winter, 110.
Federal Migratory Bird Law, 45, 191–192, 193; statement by committee of, 192–194.
Feeding of game, 144.
Ferguson, A. D., 85; fly-caught fish not injured, 42–44.
Fillet of Shad, 104.
Fin, 209, 210.
Finley, W. L., 45, 49, 212.
Fish, 14, 15, 19, 20, 21, 23, 25, 27, 39, 41, 43, 62, 63, 64, 77, 78, 81, 87, 88, 96, 99, 101, 104, 106, 111, 130, 131, 132, 133, 134, 135, 141, 142, 150, 156, 162, 165, 179, 180, 182, 187, 195, 199, 201, 204, 206, 209, 210, 211; do hooked fish die?, 42; fly-caught fish not injured, 42–44; cost of, 96; killed by mud flow, 111; floods destroy, 155; reports on the sale of, 40.
Albacore, 14, 102–103, 166, 203, 204.
Anchovy, 99, 102–103, 166, 204.
Bass, 62.
Black, 21, 50, 132, 145, 156, 180, 208, 210; at San Diego, 150.
Black Sea, 14, 102–103, 166.
Calico, 208, 210.
Rock, 14, 102–103, 166.
Sharp-eared, 210.
Strawberry, 210.
Striped, 41, 63, 96, 102–103, 104, 133, 166, 200.
White Sea, 14, 102–103, 166.
Barracuda, 102–103, 130, 133, 166.
Bonita, 102–103, 153, 166.
Buccaccio, 102–103, 166.
Carp, 102, 146, 166.
Catfish, 102–103, 145, 166.
Chilipepper, 102–103, 166.
Coalfish, 102–103, 166.
Cod, Cultus, 102–103, 166.
Ling, 21.
Rock, 153.
Tom, 102–103, 167.
Codfish, 81, 176.
Corbina, 133.
Crappie, 210.
Croaker, 133.
Dogfish, 102–103, 166.
Flounder, 102–103, 166.
Flying Fish, 15, 16, 18.
Gar, 21.
Hag-fish, 39.
Hake, 102–103, 166.
Halibut, 96, 102–103, 104, 155, 166.
Herring, 99, 102–103, 166, 198, 199.
Kingfish, 102–103, 166.
Lamprey, 21.
Mackerel, 102–103, 166.
Mullet, 102–103, 166.
Perch, 51, 102–103, 145, 166.
Sacramento, 210.
Pike, 51.
California, 102–103, 166.
Pompano, 102–103, 166.
Rock-fish, 102–103, 155, 166.
Salmon, 38, 51, 61, 62, 96, 99, 102, 104, 154, 156, 166, 190, 198, 199, 200, 209; to be tagged in Monterey Bay, 153.
Blue-back, 41.
Chinook, 41.
Dog, 41.
Humpback, 41.
King, 41.
Quinnat, 42, 88, 98, 153, 209.
Silver, 41, 42.
Sockeye, 41.
Sand-dab, 102–103, 166.
Sardine, 15, 40, 102, 153, 154, 166, 204.
Sculjin, 102–103, 166.
Shad, 58, 59, 61, 62, 63, 64, 96, 99, 101, 102–103, 104, 106, 107, 108, 133, 166, 200; to be propagated in California, 52; in California, 59–64; first taken from Columbia, 152.
Roe, 62, 153.
Skate, 102–103, 166.
Smelt, 102–103, 166, 187.
Sole, 102–103, 166.
Stickleback, 50, 182.
Sturgeon, 102–103, 166.
Sucker, 21.
Sunfish, Blue-gilled, 208, 210.
Top-minnow, 179, 180.

Trout, 21, 42, 44, 51, 88, 98, 132, 165, 187, 190, 201, 207, 208, 215.
Black-spotted, 150.
Dolly Varden, 208.
Eastern Brook, 97, 98, 150, 187; obtained in Nevada, 202.
Golden, 33, 43.
German Brown, 150, 208.
Lake, 102–103, 112, 167.
Loch Leven, 97, 145, 150.
Rainbow, 97, 145, 150, 187, 191, 203.
Sea, 102–103, 167.
Steelhead, 88, 97, 102, 142, 145, 150, 165, 187, 200, 208, 214, 215.
Tuna, 14, 15, 16, 17, 18, 19, 133, 203, 204.
Long-finned, 41, 203.
Yellow-fin, 133.
Turbot, 102–103, 167.
White Fish, 51.
Whitebait, 102–103, 167.
Yellowtail, 14, 15, 17, 18, 19, 102–103, 133, 153, 167.
Fish and Game, 14, 20, 30; information on, 87; conditions in Southern California, 131–135; lectures given to forestry students, 144; exhibit at Chico Fair, 145; in San Mateo County, 185–187.
Fish and Game Commission, California, 3, 4, 7, 8, 11, 28, 29, 32, 36, 40, 43, 59, 60, 61, 65, 78, 83, 84, 85, 88, 91, 96, 97, 98, 99, 100, 131, 132, 134, 135, 137, 139, 140, 141, 142, 143, 144, 145, 151, 153, 178, 179, 180, 183, 185, 187, 189, 190, 191, 194, 202, 206, 207, 208, 209, 212, 214.
Connecticut, 101.
Illinois, 158.
Massachusetts, 49, 101, 149, 157; will issue quarterly, 160.
Nevada, 202.
New York, report of, 60.
Oregon, 212.
Pennsylvania, 44.
United States, 51, 60, 61.
Utah, 160.
Fish and Game Commissioners, National Association of, 36.
Fish cannery, 40; statistics of, 153.
Fish culture, 98, 131, 189, 200; new quarters for department of, 97; operation of department of, 150.
Fish culturist, 59.
Fish ladder, see fishway; new screen and ladder surveys, 202.
Fish planting, 187, 190.
Fisher, 35, 84.
Fisher, A. K., 33.
Fisher, J. P., clams in San Francisco Bay, 209–210.
Fishway, 142, 143; to be installed, 98; new surveys, 202.
Fisheries, 20, 38, 41, 62, 64, 85, 96, 101, 129, 131, 155, 206, 207, 211; notes, 151, 157, 203–211; Monterey notes, 154; statistics, 99–100, 102–103, 166–167; new plant at Monterey, 154; Mendocino, 154; commercial statistics, 156; products, 156; conference at San Diego, 203–205.
Fishermen, 22, 26, 27, 38, 39, 62, 97, 101, 133, 153, 154, 155, 157, 190, 198, 199, 206, 207, 211; market, 15, 99, 100.
Fishing, 14, 45, 62, 112, 132, 133, 135, 155, 187, 211; at Santa Catalina Island—its development and methods, 14–19; popular, 190.
Flamingo, American, 192.
Flicker, Red-shafted, 89.
Flounder, 102, 151, 166; eat clam necks, 151.
Fly, 43, 44, 132.
Food, of ducks, 34, 90, 133; of cormorants, 45, 198, 199; of opossums, 46; of pheasants, 49, 95; of birds, 148; of sea-otter, 81; of band-tailed pigeon, 212; of sooty grouse, 213.
Forbush, E. H., 218.
Forest Service Co-operation, 83.
Foster, H. E., fall arrival of the Wilson snipe, 48.
Fox, 35, 211.
Cross, 35.
Gray, 158, 212.
Red, 35, 158, 212.
French, D. G., fishing at Santa Catalina Island, 14–19.
FRESNO REPUBLICAN, 28.
Frog, 21; bull, introduced into Oregon, 44.
Fry, 199.
Salmon, 97, 98, 145, 150, 156.
Shad, 59, 61.
Trout, 132, 142, 200, 201.
Fuertes, L. A., 189.
Fulvous Tree-duck, 30, 199.
Fur, 163.
Fur-bearers, 20, 21, 34, 35, 82, 84, 85, 87, 90, 91.

G

Gallinago delicata, 48, 110.
Game, 3, 4, 5, 19, 28, 31, 44, 77, 78, 88, 89, 92, 111, 131, 133, 144, 145, 149, 190, 193, 194, 197, 212; parcels post shipments of, 84; and cold weather, 85–86; wild, 157; seasons on, counties may close in Pennsylvania, 44–45; its preservation, 143; conditions in Great Britain vs. conditions in California, 3–10; California's prehistoric, 82; early conditions in Siskiyou County, 123–125; resources advertised by Forest Service, 190; ranchers protect, 191; Mississippi establishes commission, 212.
Animals, 20, 21, 84, 216.
Birds, 6, 9, 38, 34, 38, 84, 85, 109, 146, 148, 158, 160, 186, 189, 190, 216; propagation of, 9, 10.
Fish, 189.
Game Farm, State, 9, 29, 30, 32, 36, 37, 46, 85, 120, 145, 199.
Gamekeeper, 4, 5.
Game Laws, see law.
Game Refuge, see refuge.
Game Sanctuaries, see sanctuary.
Game Warden, see warden.
Geese, 110, 143.
Gill, 210.
Gest, 137.
Godwit, Hudsonian, 193.
Goose, 49.
Canada, successfully bred in California, 47.
Honker, 47.
Grebe, 209.
Grinnell, J., 38, 126, 216.
Grizzly, 65, 66; does it exist in California?, 65–69.
Grouse, 5, 6, 20, 87, 91, 110, 190; in the Eldorado National Forest, 164.
Columbian Sharp-tailed, in Oregon, 45; in northeastern California, 161.
Pinnated, 193.
Prairie Sharp-tail, 193.
Sage, 193.
Red, 4.
Ruffed, 44, 45, 148.
Sooty, 110; in Trinity County, 212–213
Guinea Pig, 12.
Gull, 45; destroy mice, 218.
California, 218.
Gun Club, 3, 8.
Gun, automatic, 157; pump, 157.

H

Hag-fish, 39.
Hake, 102–103, 166.
Haliotis, 182.
rufescens, 176.
Halibut, 96, 104, 155.
California, 102–103, 166.
Hammond, L. W., mourning doves bred in captivity, 163.
Hare, 4.
Hatchery, 101, 132; in full operation, 97–98; notes, 151–157, 199–203; the shad hatchery at Yuba City, 199; the Inyo, 203.
Almanor, 200, 202.
Bear Valley, 201.
Brookdale, 98, 201.
Eel River, 40, 200.
Fort Seward, 150, 200.
Inyo, 213.
Kearsage, 150.
Oak Creek, 134.
Price Creek, 98.
Sisson, 97, 150, 201, 202.
Tahoe, 202.
Tallac, 201.
Ukiah, 98, 200.
Verdi, 98, 202.
Hawk, 31, 86.
Heacock, R. B., 39, 41.
Hearing, at Santa Rosa, 87–88, 89; at Eureka, 205–208.
Heath Hen, 193.
Heath, H. E., 40; California clams, 175–178.
Heckmann, W. H. H., 207.
Hedderly, E. L., notes from the Los Angeles district, 85; fish and game conditions in Southern California, 131–135.
Herring, 99, 102–103, 166, 198, 199.
Horn, D. H., 190.
Hoerl, J. H., 97.
Hog cholera, 214.
Holder, C. F., 14, 29–30.
Honker, 47.
Horned Lark, 34.
Hoyt, F. D., malformed antlers, 48.
Hubbs, C. L., 151.
Hudson, C. B., 189.
Hunt, E. W., 97, 199.
Hunter, J. S., fish and game in San Mateo County, 185–187.
Hunters, 8, 9, 10, 79, 80, 89, 93, 96, 111, 112, 122, 144, 146, 159, 162, 186, 187, 192, 196.

Hunting, 45, 81, 93, 109, 123, 135, 138, 185, 190; accidents, 93, 136, 186, 214, 216.

I

Ibis, Scarlet, 192.
Insect, 49; control, artificial vs. natural methods, 49.
Is it any wonder?, 145.

J

Jack Rabbit, 215.
Jay, 34.
Johnston, E. F., 204.
Jordan, D. S., first shad taken from Columbia, 152.

K

Kelp, 18, 204; will cutting injure the fisheries?, 129–131.
Kennedy, C. H., a possible enemy of the mosquito, 179–182.
Kingfish, 102–103, 166.
Kingfisher, 199.
Kite, use in fishing, 15–18.
Kite, White-tailed, 193.
Klamath Lake Bird Reservation, 89.
Klamath River Jack, 195.
Klink, P., early game conditions in Siskiyou County, 124.

L

Lambson, G. H., 97, 199.
LA NATURE, 184.
Larus californicus, 218.
Law, 182, 212; the trespass in Alabama, 109; buck, advantages of a, 138.
Crab, 206.
Fish, 88, 97.
Game, 10, 28, 36, 91, 108, 125, 145, 159, 163, 196, 214, 215; harmonized with federal regulations, 45; vs. knowledge, 89; unique, 108.
Fish and Game, 77, 78, 112, 141, 142, 144, 160, 190; some suggested changes in, 197–198.
Lepomis pallidus, 210.
License, 85, 131, 135; angling, 187; fishing, 190; game, 5; hunting, 6, 187, 212; shooting, 8; trapper's, 84; commercial fishing, 99.
Limit, 143.
Lion, bounties, 115.
Mountain, see mountain lion.
Laws, G. O., 138, 165.
Little, E. V., the opossum in Los Angeles County, 46.
Littlejohn, C., habits and hunting of the sea otter, 79–82.
Lobster, Spiny, 101, 102–103, 129, 155, 167.
Los Angeles District, notes from, 84–85.

M

Mace, B. H., nesting of the sooty grouse, 110; swat the coyote, 213–214.
Mackerel, 102–103, 166.
Macoma, 210.
secta, 178.
nasuta, 178, 209.
Macomas, 178.
Macrocystis pyrifera, 130.
Malformations, 120.
Magpie, 34.
Mallard, 49, 90, 147, 161, 189.
Malone, W. C., 201.
Mammals, 31, 145.
Big Game, 38, 67, 145.
Fur-bearing, 34; Oregon protects, 84–85.
Predaceous, see predatory.
Manly, W. M., Sierra mountain sheep in the Mono National Forest, 111; sage hens in the Mono National Forest, 163.
Market Hunter, 143.
Marshall, A. H., 191.
Marten, 35, 84.
Mastodon, 82.
McAtee, W. L., 34.
Merrill, H. G., fish killed by mud flow, 111; good case made by Lassen ranger, 112.
Mice, gulls destroy, 218.
Field, 22.
Michael, E. L., 205.
Migration, 110.
Migratory Bird Law, see federal migratory bird law.
Miller & Lux, 71, 76.
Milt, 40, 41.
Mink, 35, 84, 92, 109, 158, 211, 212; domesticating, 92.
Mollusk, 40, 99, 102–103, 167, 204; distribution of food fishes and mollusks to be studied, 151.
Mosquito, 50; a possible enemy of, 179–182.
Mountain Lion, 32, 35, 213.
Mountain Quail, see Quail.

Mountain Sheep, 125, 160.
Desert, 32.
Sierra, 14; in Mono National Forest, 111; seen in Oak Creek Pass, 213.
Mullet, 102–103, 166.
Museum of History, Science and Art, 82.
Museum of Vertebrate Zoology, 38, 65, 68, 69, 125, 129, 144, 196.
Muskrat, 84.
Mussel, 125, 176, 178.
California, 101, 102–103, 155, 167.
Black, 176, 178.
Mya arenaria, 40, 177, 210.
Mytilus californica, 176, 178.

N

Nacre, 183, 184, 185.
National Association of Audubon Societies, 91.
National Educators Conservation Society, 138, 157.
National Forest, 7, 193.
Angeles, 164.
California, 110, 141, 165, 213; improved conditions in, 214–215.
Cleveland, 112, 164, 215.
Eldorado, fishing in, 165.
Lassen, 111.
Modoc, 161.
Mono, 111, 163.
Plumas, 112.
Santa Barbara, peculiar deer killed in, 164.
Sequoia, 214.
Shasta, 111.
Sierra, 214.
Trinity, 140, 190, 212.
Neale, Geo., 47, 190; ducks vs. rice, 49–50; black bass eat mosquitos, 50; commission feeds deer and quail, 83–84.
Nest, 110, 161; of green-winged teal, 46; of valley quail, 47; of mallard duck, 147, 161; edible birds', 109–110; of swifts, 109–110; of band-tailed pigeon, 212; of sooty grouse, 213.
Net, 38, 39, 41, 80, 141, 156, 180, 190, 207.
Crab, 23, 24.
Gill, 39.
Herring, 198.
Hoop, 22, 23.
Salmon, 62.
Trammel, 38, 39.
Nettion carolinense, 46, 110.
Newbert, F. M., 84.
Newkirk, G., Dr. Charles Frederick Holder, 29–30.
New York Zoological Society, 149.
Nidever, H. B., shad in California, 59–64.
Nightingale, 93.
Noack, H. R., band-tailed pigeons bred in captivity, 212.
Non-game birds, 52, 114, 170.

O

Ober, E. H., 196; feeding game, 86; mountain sheep seen in Oak Creek Pass, 213.
Odocoileus columbianus columbianus, 48, 118.
columbianus scaphiotus, fawns born in winter, 110.
Ohl, H. C., gulls destroy mice, 218.
Oliver, J. H., abalone pearl formation, 182.
Onchorhynchus gorbuscha, 41.
keta, 41.
Opossum, in Los Angeles County, 46–47; in Alameda County, 110; in Amador County, 111.
OREGON SPORTSMAN, THE, 44; in new form, 45.
Ornithological work, suggestions for, 146.
Otter, 79, 80, 81, 82, 84.
River, 35.
Sea, 79, 80, 81.
Oris canadensis sierræ, 213.
Owl, 93.
Oyer, P. H., 39, 110.
Oyster, 101, 102–103, 157, 167, 178, 207, 209; of San Francisco Bay, 208; chlorinating, 208.

P

Panama-California International Exposition, 76.
Panama-Pacific International Exposition, 30, 32, 33, 209.
Panther, 190.
Parakeet, Carolina, 192.
Partridge, 4, 5, 6, 93, 148.
European, 196.
Hungarian, 44; established in British Columbia, 196.
Pearl, formation in abalone, 182–185.
Pediœcetes phasianellus columbianus, 161.

Pelican, White, 161; formerly nested near Sacramento, 161.
PENNSYLVANIA SPORTSMAN, 159.
Perch, 51, 102–103, 145, 166.
  Sacramento, 210.
Perkins, C. R., 139.
Permanent Wild Life Protection Fund, 193.
Petrel, Black-capped, 193.
  Wilson Stormy, 38.
Pheasant, 4, 5, 6, 28, 30, 32, 93, 145, 148; a mixed ration for, 95; a great work on, 149; increase on Yerba Buena Island in San Francisco Bay, 163; obtain an authoritative work on breeding, 196.
  American, the breeding and shooting of, 149.
  Chinese, 49.
  Golden, 32, 144, 199.
  Ring-necked, 32, 44, 95, 149, 199; as an insect destroyer, 49; in Utah, 157.
  Silver, 32, 199.
Phalacrocorax auritus, 198.
Pierce, C. C., and Clegg, M. T., the effect of strychnine sulphate on California valley quail, 11–13.
Pigeon,
  Band-tailed, 193; bred in captivity, 212; alleged destroyers of grain, 212.
  Domestic, 212.
  Nicobar, 212.
  Passenger, 192.
  Wild, accused of carrying hog cholera, 214.
Pike, 51.
  California, 102–103, 166.
Pintail, 110, 199.
Plankton, 204.
Plover, Black-breasted, 191.
  Golden, 191, 193.
  Upland, 193.
Poaching, 199.
Poison, 11, 33, 112, 216, 217.
Pollution, 21, 149.
Pompano, 102–103, 166.
Pomoxis annularis, 210.
  sparoides, 210.
Poster, a Connecticut, 44.
Prairie Chicken, 45, 161.
Prairie Dog, 33.
Pratt, G. D., conservation costs little in New York, 211.
Predatory animals, 85, 86, 144, 190, 191; Pennsylvania pays bounty on, 158; being killed in California National Forest, 213.
Prescott, H. S., 39.
Precipitin test, 137.
Preserve, 90, 206.
Propagation of fish, 45, 101.
Protection of forest, fish and game animals, science and progress in, 19–22.
Ptarmigan, 169.

Q

Quail, 11, 12, 13, 29, 28, 30, 44, 45, 47, 85, 86, 91, 131, 145, 186, 190; commission feeds, 83–84; reappearance of disease, 95; feeding houses for, 96; Minnesota advocates feeding, 199; shooting for market in San Mateo County, 188; season, 214.
  Bobwhite, 30, 199.
  California Valley, 11, 13.
  Mountain, 30, 33, 86, 186.
  Valley, 30, 32, 33, 86, 186, 199; successfully propagated, 17–18.
Quarles, E. A., 196.

R

Rabbit, 190; damage crops in San Diego County, 215–218.
  Cottontail, 186, 215.
  Brush, 186.
  Jack, 215.
Rabies, 111, 214.
Raccoon, 35.
Rae Lakes, 196, 203, 213.
Rail, Clapper, 186.
Ralston, E. B., 186; shooting quail for market in San Mateo County, 188.
Rancho La Brea, 82.
Ranger, 215; good case made by, 112.
Rankin, E. P., 204.
Rattlesnake, 215.
Recipes, 106, 107, 108.
Reel, 14, 15, 19.
Refuge, 36; game, 35, 36, 164, 165; a chain of, for California, 189.
  Angeles National Forest, 164.
  Cleveland National Forest, 164.
  Pinnacles National Monument, 86.
  Trinity National Forest, 165.
Reindeer, 9.
REPORTS.
  Violations of fish and game laws, 52, 114, 170, 219.

Salvation and searches, 53, 113, 169, 219.
Financial, 54, 116, 171, 220.
Fishery products, 102–103, 166–167.
Lion hunting, 115.
Number of deer killed during season 1914–1915, 168–169.
Reservation (see refuge), bird, 35; attempt to abolish Klamath Lake, 89.
Ring-tailed Cat, 35.
Ritter, W. E., 205.
Robin, 89.
Rock fish, 102–103, 155, 166.
Rod, 14, 19.
Rodent, 148.
Roe, 40.
Salmon, 40, 41.
Shad, 40.
Russell, W., early game conditions in Siskiyou County, 124–125.

S

Sage, Mrs. Russell, 108.
Sage Hen, 87, 163; courting of, 163; in Mono National Forest, 163.
Salmon, 38, 51, 61, 62, 88, 96, 98, 99, 102–103, 104, 154, 156, 166, 190, 198, 199, 200; fall run of, 41–42; to be tagged in Monterey Bay, 153; market, liberated, 209.
Blueback, 41.
Dog, 41.
Humpback, 41.
King, 41.
Quinnat, 41, 42, 88, 153, 209.
Silver, 41, 42.
Sockeye, 41.
Salt licks, 190; for deer, 140–141.
Sanctuary (see refuge), 36, 91, 189; cemeteries as, 91; in Pennsylvania, 108; bird, in Illinois, 158.
Game, 108, 109, 157, 158, 194; Utah plans, for each county, 109.
Sand-dab, 39, 102–103, 166.
Sand-flea, 63.
SAN FRANCISCO EXAMINER, 2, 8, 142.
Sandpiper, Red-breasted, 193.
Pectoral, 193.
Sardine, 40, 102–103, 153, 154, 166, 204.
Sauthene, 178.
Sayidomus gigantea, 178.
Schaeffle, E., 193, 212; the need of co-operation in fish and game preservation, 77–79.
SCIENTIFIC AMERICAN SUPPLEMENT, 184, 185.
Scientific collector, the, 146.
Scofield, N. B., 22, 50, 88, 142, 189, 205; the humpback and dog salmon taken in San Lorenzo River, 41; will cutting the kelp injure the fisheries, 129–131; calico bass, sharp-eared bass, and bluegill sunfish, 210; commercial fishery notes, 203–211.
Scott, E. L., grouse in the Eldorado National Forest, 164.
Screen, 98, 111; to be installed, 98–99; new screen and ladder surveys, 202.
Scripps Institution for Biological Research, 130, 131, 155.
Sculpin, 102–103, 166.
Sea Brant, Eastern, 38.
Sea Lion, tried as carp killers, 145.
Sea Otter, habits and hunting of, 79–82.
Sea-trout, 102–103, 166.
Sea-urchin, 81.
Seal, 81.
Seaweed, 81.
Seine, 23.
Sentences, judges give severe, 141.
Seton, E. T., 126.
Shad, 38, 50, 61, 62, 63, 64, 99, 102–103, 153, 166, 199, 200; spawn to be furnished Eastern states, 101; as a food fish, 104; preparation of fillet of, 104–105; removal of bones from, 106; recipes, 106–108; to be propagated in California, 152; first taken from Columbia, 152; hatchery at Yuba City, 199–200.
Sharp, H. M., 194.
Shebley, F. H., 213.
Shebley, W. H., 97, 189; hatchery notes, 199–203.
Sheep, Mountain, see mountain sheep.
Shellfish, 40, 182, 184, 185, 209; selection of, 156.
Shoemaker, C. D., 45.
Shook, H., 47.
Shoot, look before you, 196.
Shore birds, 33, 191; and their future, 35.
Shrimp, 27, 63, 101, 102–103, 167.
SIERRA RANGER, 49.
Siphon, 208, 209.
Skate, 102–103, 166.
Skylark, 152.
Skunk, 31.
Spotted, 35.
Striped, 35.
Sloth, Ground, 82.

Smelt, 102–103, 187.
Smithsonian Institute, 152.
Snail, 175, 182.
Snake, 215; club urges protection of, 197.
  Garter, 20.
  Water, 20.
  Rattlesnake, 215.
Snipe, 110, 111, 148.
  Wilson, 110, 191; fall arrival of, 48; unusually abundant in Alameda County, 110–111.
Snow Mountain Dam hearing, 141.
Sole, 39, 102–103.
Song-bird, 89, 91, 109, 148, 152; are killed, 89.
Sparrow, 38; English, 144; war to be waged on, 141; campaign against, 191.
  European House, 144, 191.
  Song, 147.
Spat, 210.
Spawn, 101, 178.
Spiked Buck, 36, 122.
Spoonbill, 199.
  Roseate, 38, 192.
Sportsmen, 5, 8, 19, 28, 44, 77, 78, 87, 131, 132, 134, 146, 190, 193; show, 95–96; to the sportsmen of California, 49; organizations of, in Massachusetts, 157.
Spray, 216.
Spring Shooting, 156, 160.
Squid, 101, 102–103, 167, 204.
Squirrel, 11, 13, 44, 190; poisoning and valley quail, 33–34.
  Gray, 186; in Plumas National Forest, 112.
  Ground, 11, 12, 13, 215.
  Red, 20.
  Tree, 33.
STAATS–ZEITUNG, 159.
Stag, 5, 121, 122.
Stanford University, 151, 175.
Stanley, A. J., gray squirrels in the Plumas National Forest, 112.
Starling, spread of in New England, 218.
State Board of Health, 150, 208.
Steele, A. J., 203.
Steelhead, see trout.
Stickleback, 50, 182.
Sting-ray, 151; destroyed, 157.
Stomach contents, 26, 181.
Stomach examination, 49, 181.
Strychnine, 216; effect of on valley quail, 11–13.
Sturgeon, 102–103, 166.
  Caviar, 99.
Sucker, 21.
Sunfish, Blue-gilled, 208, 210.
Swan, Trumpeter, 192.
Swift, 109, 110.
Swiftlets, 109, 110.

T

Tadpole, 44.
Taverner, P. A., 146, 198.
Teal, Cinnamon, 46, 199.
  Green-winged, 110, 199; nesting in Alameda County, 46.
Thrush, 93, 152.
Tiger, Saber-toothed, 82.
Tillotson, M. R., elk in Shasta County, 111; trapping for fur in the Shasta National Forest, 111.
Timber Wolf, in California, 125–129.
Tivela stultorum, 175.
Toms, W., 90.
Top-minnow, 179, 180.
Towhee, 89.
Trapper, 84, 111.
Treaty with Canada, 192.
Trespass, 4.
Trolling, 14, 42.
Trout, 21, 33, 42, 44, 51, 88, 98, 132, 134, 187, 190, 201, 207, 208; in Goose Lake, 112; large, taken at Stony Creek Dam, 165; to be rescued from streams, 215.
  Black-spotted, 150, 202.
  Dolly Varden, 208.
  Eastern Brook, 97, 98, 145, 150, 187; obtained in Nevada, 202.
  German Brown, 150, 208.
  Golden, 33, 43.
  Lake, 102–103, 112, 166.
  Loch Leven, 97, 145, 150.
  Rainbow, 97, 145, 150, 187, 191, 203.
  Steelhead, 88, 97, 102–103, 150, 166, 187, 200, 208, 214, 215.
Tubbs, C. E., the opossum in Amador County, 111.
Tuna, 14, 133, 153, 203, 204; club, 14.
Turbot, 102, 166.
Turkey, Wild, 44, 158, 163; a game bird in Pennsylvania, 158.
Turtle, 21.

U

United Anglers League, 211.
United States Biological Survey, 33, 34, 35, 111, 128, 148, 192, 213, 215.
United States Bureau of Fisheries, 97, 204, 207.

United States Department of Agriculture, 34, 35, 36, 92, 128, 129, 192, 217.
United States Forest Service, 7, 83, 87, 111, 189, 194; co-operation, 163; game resources of California advertised by, 190.
United States Public Health Service, 11.
University of California, 69, 125, 144, 183.
Ursus americanus altifrontalis, 68.

V

Varmint, 213.
Venison, 28, 138, 214; can be distinguished from other meats, 137; should be utilized, 164.
Vermin, 10, 148, 149, 197.
Violators, four classes of, 196–197.
Von Blon, J. L., 196.

W

Walters, C., 213.
Ward, L. A., valley quail successfully propagated, 47–48.
Warbler, Tennessee, 38.
Warden, Game, 29, 36, 45, 193; and automobiles, 92; duties in Pennsylvania, 197; in Wisconsin furnished motorcycles, 211.
Warren, L. J., 86.
Waterfowl, 30, 45, 143, 159, 197.
Water Thrush, Louisiana, 38.
Water Turkey, 38.
Weasel, 31, 35, 109, 158, 211, 212.
Wehland, H., 215.
Westerfeld, C., 43, 196; game conditions in Great Britain vs. conditions in California, 3–10.
Weymouth, F. W., contributions to the life history of the Pacific coast edible crab, 22–27.
Whale, 81.
  Killer, 81.
Whitebait (fry), 102–103, 157.
Whiteman, L. H., 189, 213.
Who is responsible?, 91.
Wild Cat, 35, 158, 211, 212.
Wildfowl, 5, 34, 90.
Wild Life, 38, 44, 82, 91, 143, 157, 192; protection fund increased, 108–109.
Willet, 193.
Wolf, 82, 125, 127, 128, 129, 148.
  Gray, 125, 126.
  Timber, 125, 126, 127.
Wood, C. A., some suggested changes in fish and game laws, 197–198.
Woodcock, 148.
Wood Rat, 216.
Wood Duck, 30, 193.
Woodpecker, 49.
Wren, 147.
Wynne, S. W., deer need closed season, 164.

Y

Yellowlegs, Greater, 191.
  Lesser, 191.
Yellowtail, 102–103, 133, 153, 167.

Z

Zonaidura macoura marginella, 163.

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